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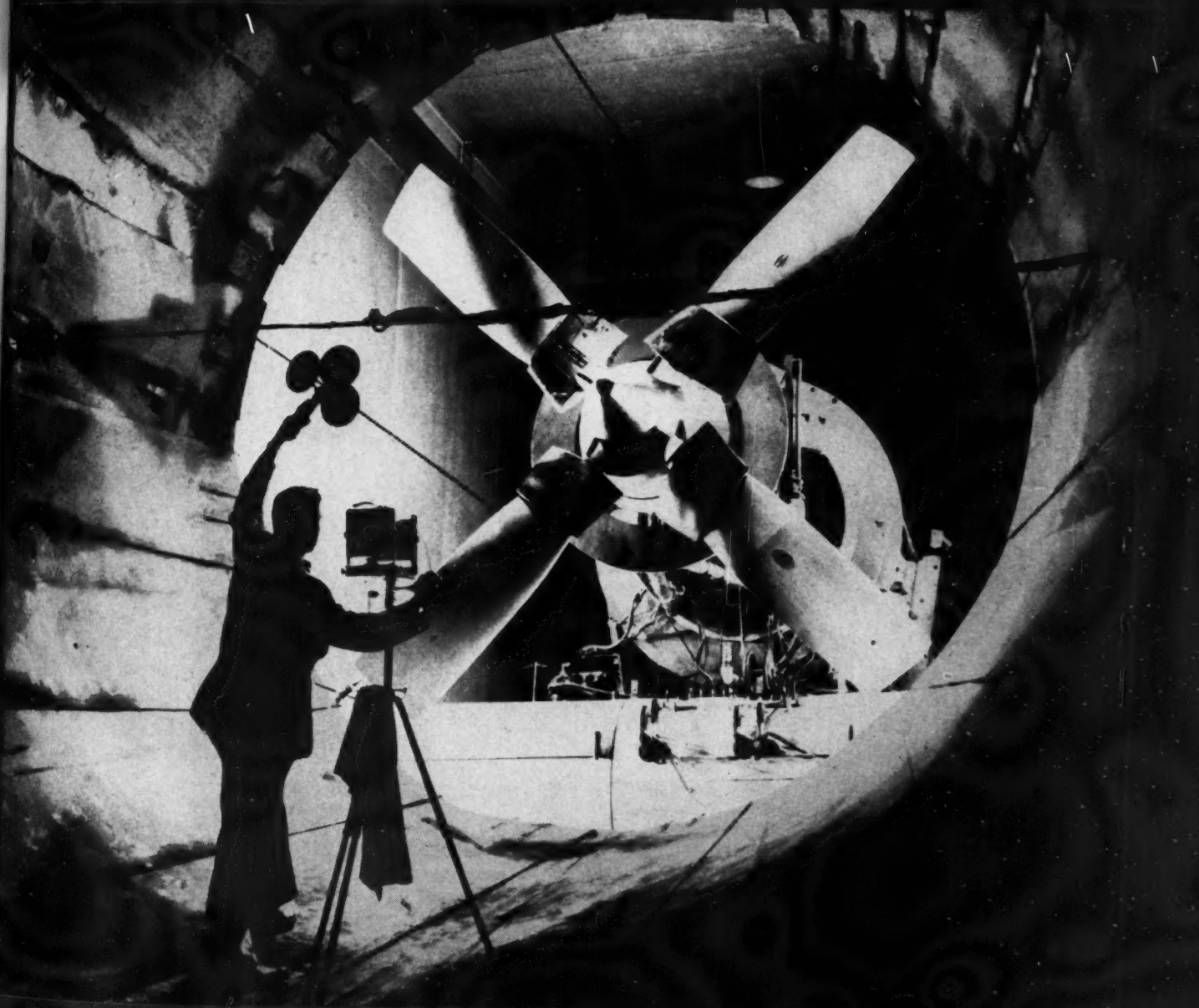

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OCTOBER 1958

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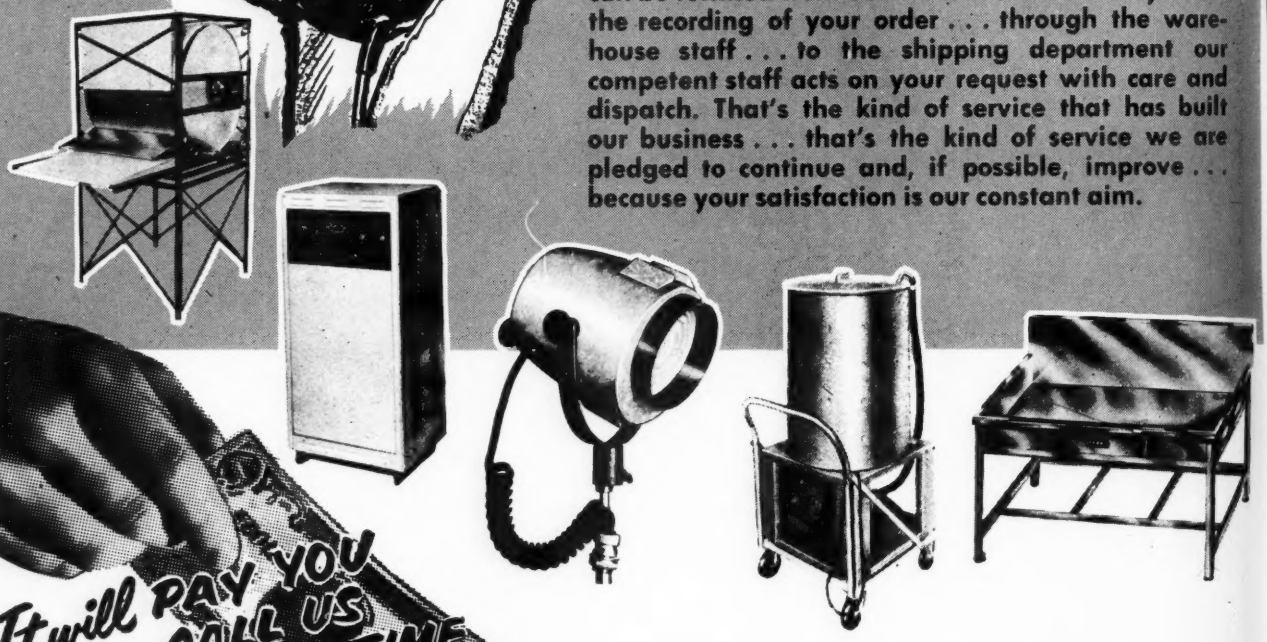

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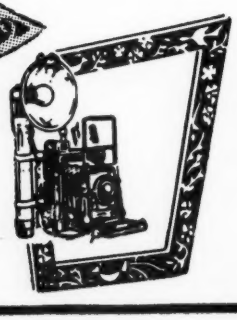

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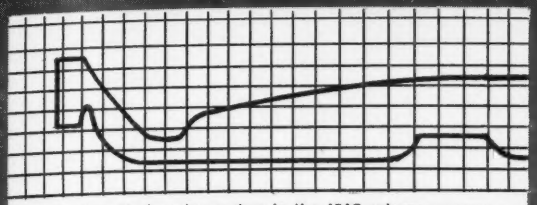

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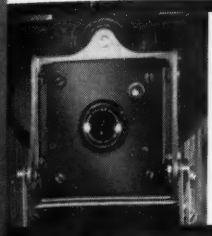

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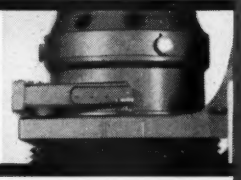

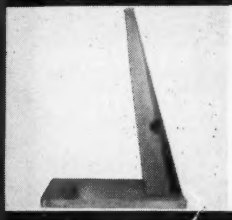

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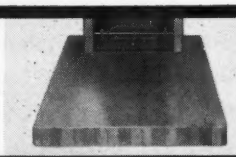

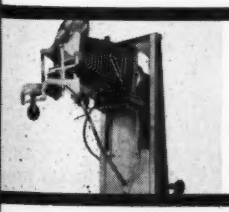

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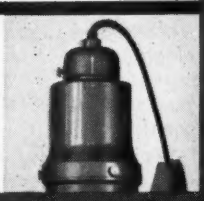

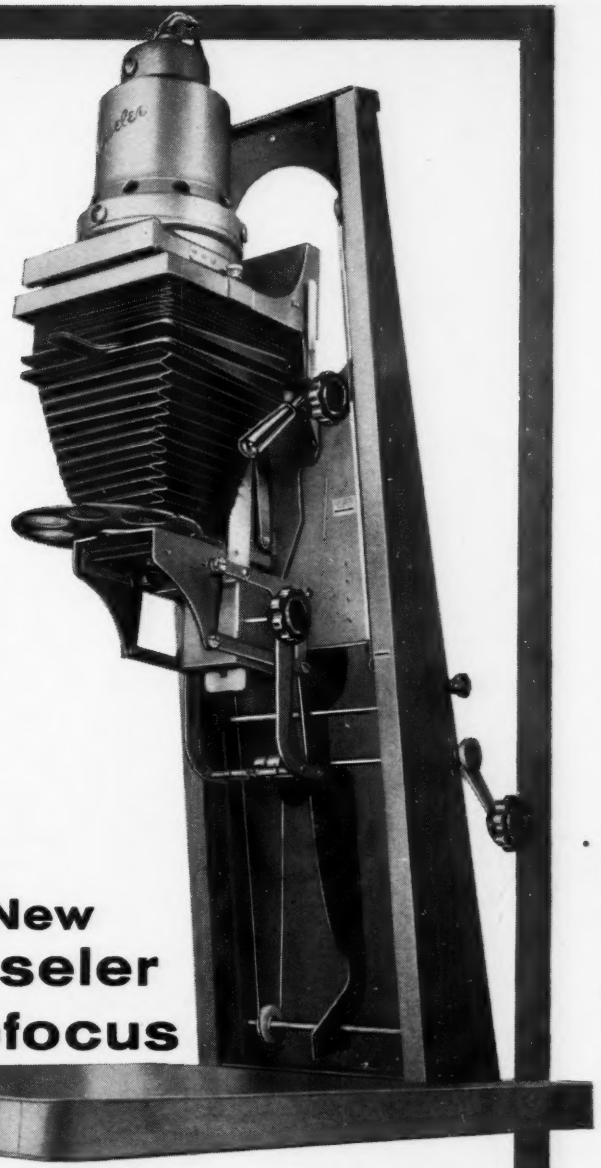

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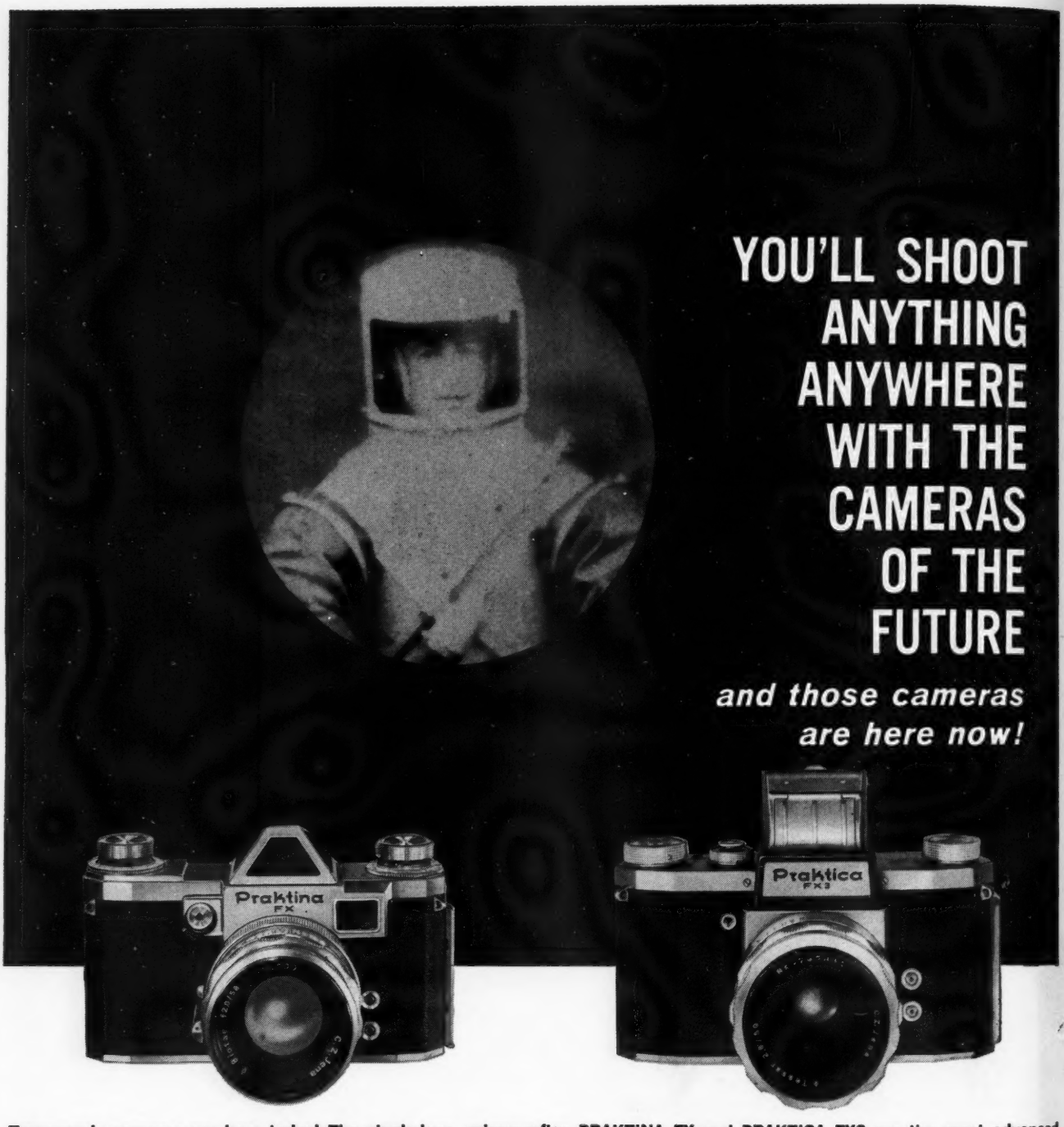

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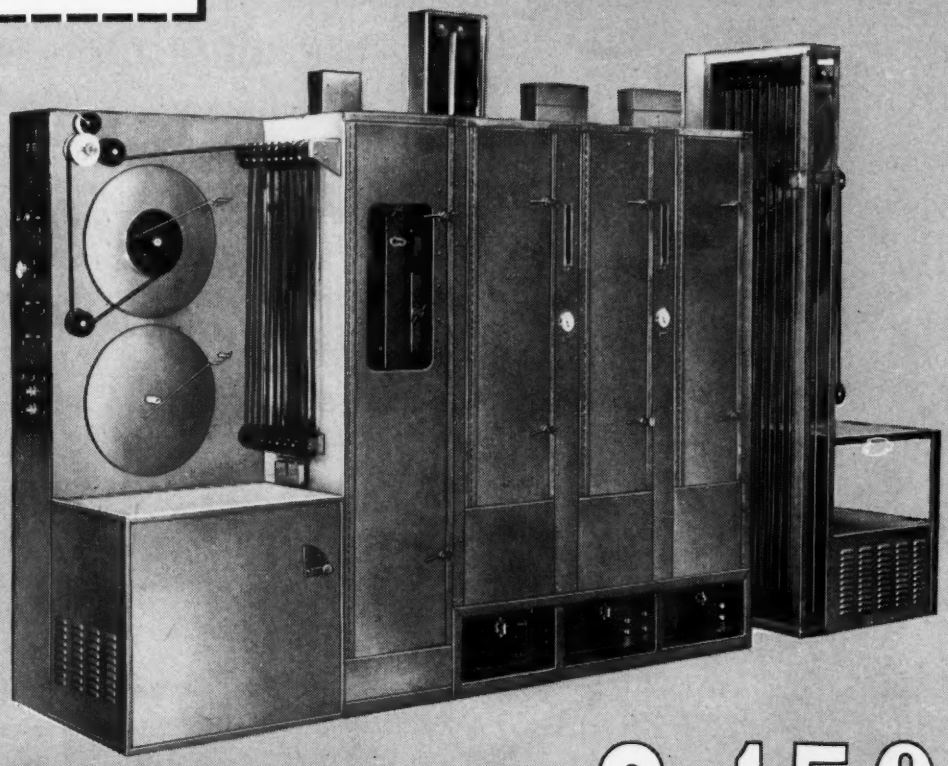

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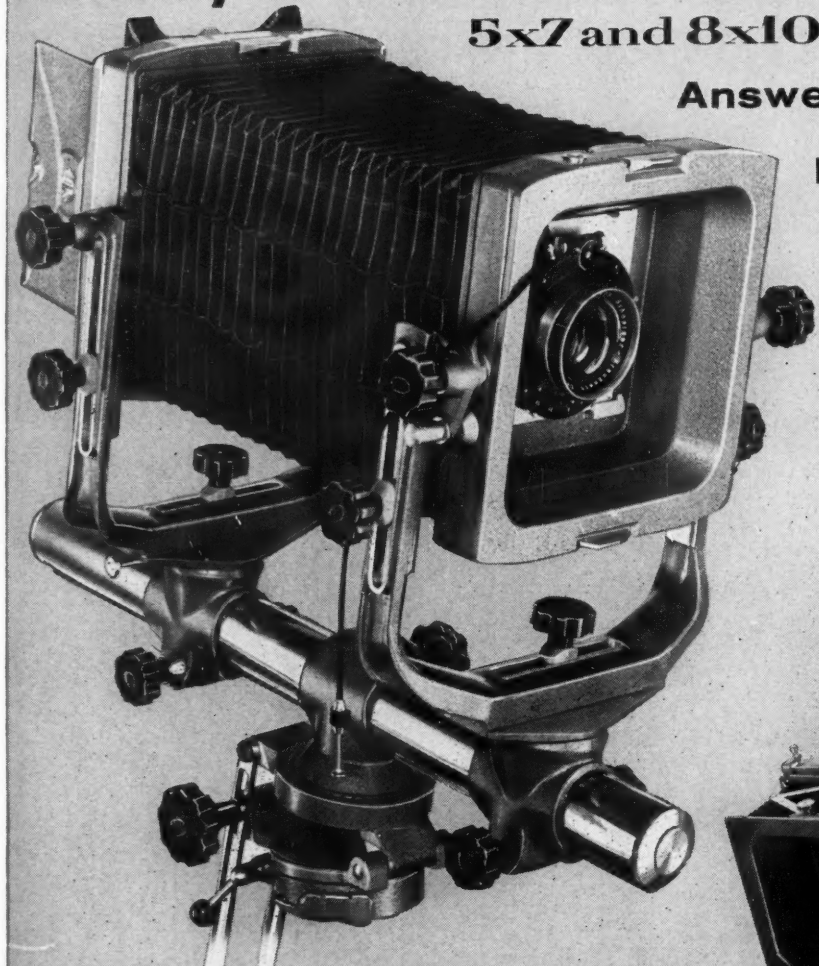

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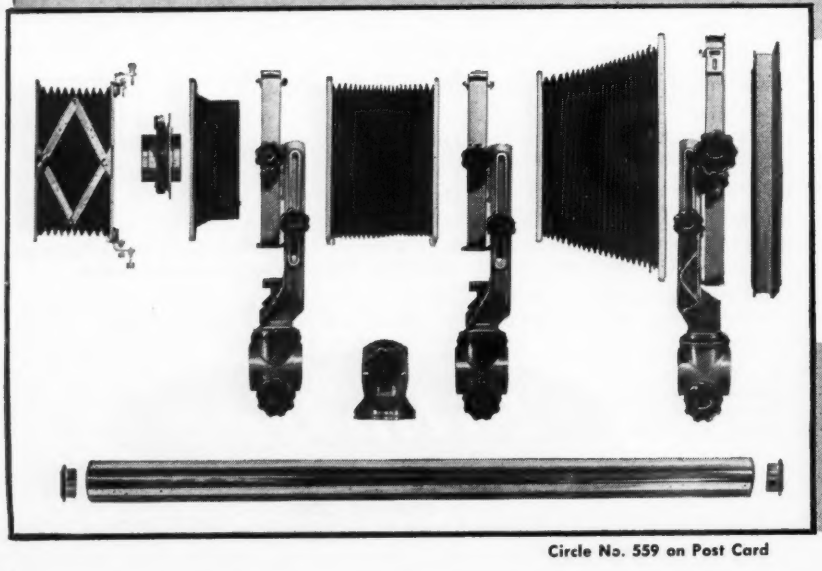

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THE MAGAZINE OF PHOTOGRAPHY AT WORK IN BUSINESS, INDUSTRY, GOVERNMENT AND SCIENCE

OCTOBER 1958

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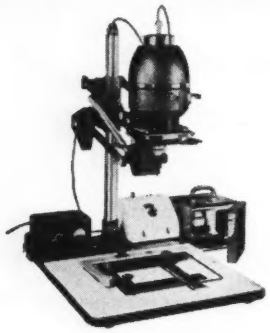

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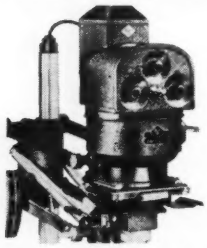

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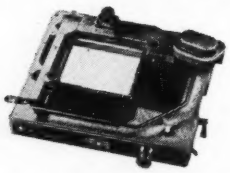

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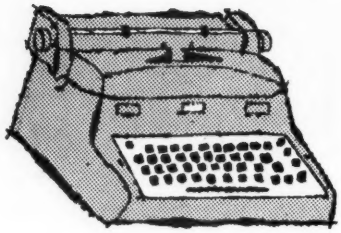

Editor's Mail

Setting the Record Straight

I read with interest the article in the August issue entitled "GM Photo Dept. Simplifies Reproductions on Metal" by Frank Smith. Mr. Smith neglected to mention that the described process (same size reproduction) is covered by our patents pending and patents issued. The process described was developed by us in 1943 and has been extensively used by ourselves and various licensees to serve the aircraft and automotive industries for the past 15 years. — C. G. Shuert, President, Engineering Reproduction, Inc., Detroit.

We are pleased to be able to give credit where credit is due.

Music to Our Ears

I have just read the article you did on the Sperry Gyroscope Company's use of high-speed motion pictures. Your handling of this technical story was excellent and from the viewpoint of our Public Information Department presented Sperry's engineering and research abilities in the best possible way.

The layout on the article did much to make it attractive to the reader. In fact, I have noticed the general appearance of the entire book has become much "sharper" and a great deal more attractive than it was in earlier editions. — James N. Bannister, Sperry Gyroscope Co., Great Neck, N. Y.

Wants To Fill Gaps

I look forward to each issue of INDUSTRIAL PHOTOGRAPHY, which has proven to be a valuable assistant to me.

While I spent my last two years in the service, it followed me wherever I went. Even in Europe it kept me up-to-date on the happenings and new developments in American industrial photography.

A few issues have been misplaced and I would like to replace them. Can you send me Issue Number One of 1955, the issues for June, 1956 thru January, 1957 and Issue Number One of 1958? I would also appreciate receiving all your indexes from 1955 through 1957. — W. Moellmann, Photographic Dept., Dearborn Machinery Co., Dearborn, Mich.

The gaps in Mr. Moellmann's collection have been filled.

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Ingenious Practices

JAMES J. HUGHES, Executive Editor

Readers are invited to send their Ingenious Practices to James J. Hughes, INDUSTRIAL PHOTOGRAPHY, 10 East 40th Street, New York 16, New York. Payment of $10 will be made for acceptable items accompanied by photographs illustrating the techniques.

PRINTED LAYOUT SHEETS

The design and use of the printed layout sheets described here comprise a technique which simlifies one aspect of photographic work.

At the Underwater Sound Laboratory, certain standards have

been set for photographic prints. Distracting backgrounds are removed from photographs by masking and opaquing. When used in technical reports, photographs carry official identification legends. A one-inch binding margin is provided on the left side or at the top, as dictated by binding requirements, and allowance must be made for printing the legend information to the right or at bottom.

Standard procedures have been set up to achieve layout uniformity. For 8- x 10-inch film, the image size can not exceed 6½- x 8½ inches. This allows space for the title requirements, whether the composition is vertical or horizontal. All report-size photographs are printed on 8- x 10½-inch paper.

Images on negatives may vary in width or length below the 6½- x 8½-inch standard, depending upon the size of the material photographed. To accommodate these, a layout chart was designed and it is now in regular and satisfactory use.

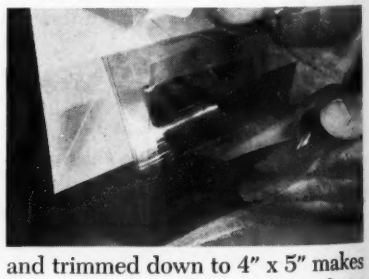
Two master layout charts were devised, one for horizontal and one for vertical negatives. These charts provide for a one-inch border at the left or at the top, depending upon whether the negative is vertical or horizontal. The negative centers the 6½- x 8½-inch area. To eliminate the need for two stocks of cards, the chart for vertical negatives is printed on one side of the form, and the chart for horizontal negatives on the reverse side.

If a horizontal negative measures 4 x 8 inches, the layout man has no measuring to do. He merely selects the number 4 at the top and bottom of the chart and number 8 on each chart and makes the cut. Negative data and related material are then inserted. The chart itself, cut to size, is used as the mask in printing the individual negative.

In any shop where the procedures can be standardized and will be repetitious, it would be beneficial to have offset-printed copies of this chart or an adaptation of it. The method described above can be used wherever photographic, photo-offset or other standard layout is done. — *James F. Selvidio, Navy Underwater Sound Lab., New London, Conn.*

GELATIN FILTER CASE

Outdated film when fixed out



and trimmed down to 4" x 5" makes a time-saving filter case for gelatin filters. These acetate sheets are stapled together along one edge and stored in a suitable envelope. Identifying stickers can be placed in one corner or marked with ink. This eliminates a lot of wrapping and unwrapping when trying to decide on a color-compensating filter where tolerances are narrow. — *Bil Toman, Palatine, Ill.*

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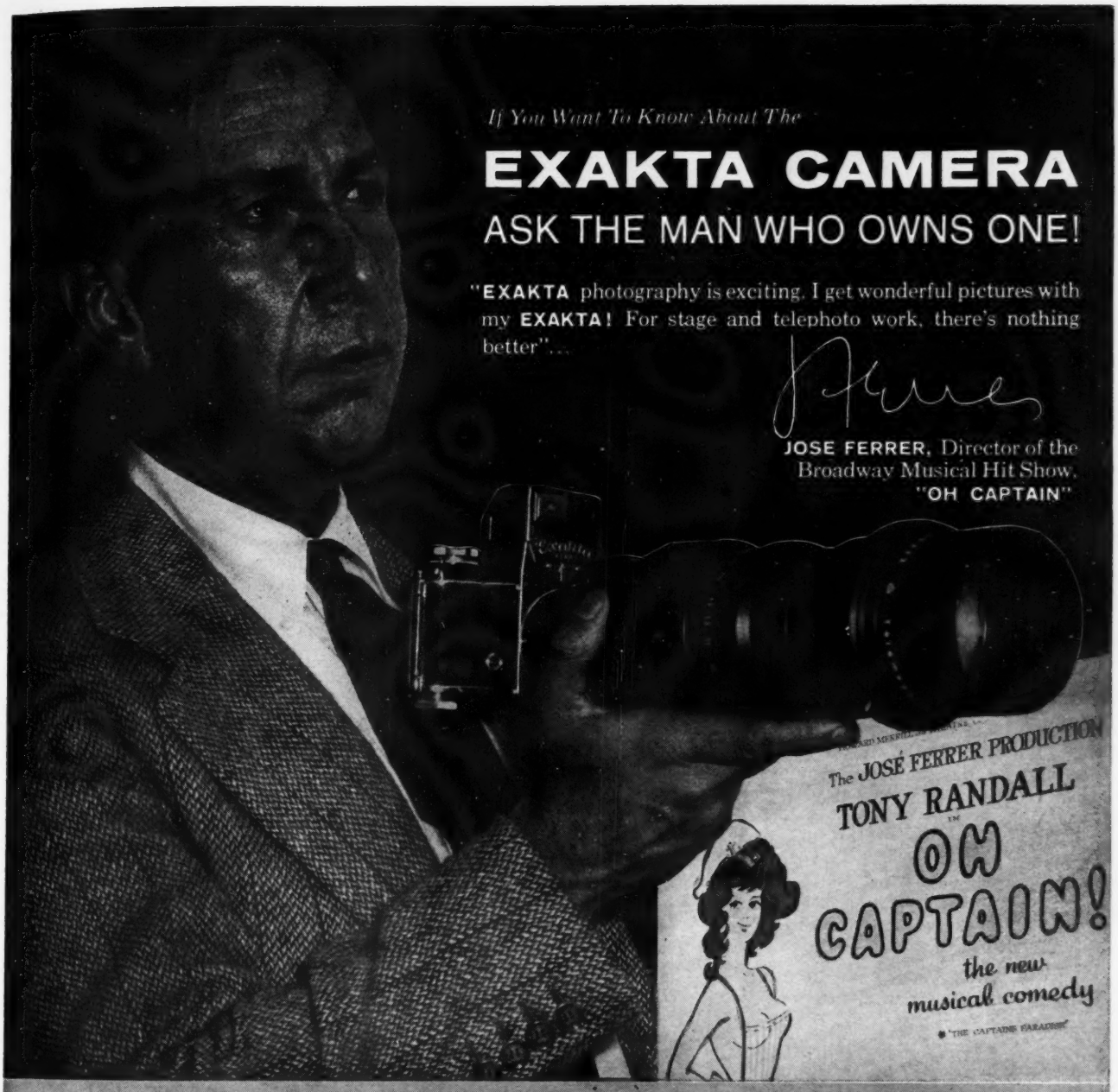
JOSE FERRER, Director of the Broadway Musical Hit Show, **"OH CAPTAIN"**



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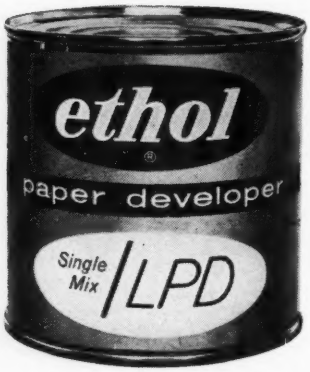

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Association News

MITCHELL BADLER, Managing Editor

NAVA Convention

The National Audio-Visual Convention held at the Morrison Hotel, Chicago, July 26-29, spotlighted the rapid expansion of audio-visual communications forecast for the early 1960's. Visitors at the convention were permitted to examine and operate all the major makes of audio-visual equipment which took over one-third of a mile to exhibit.

Among the groups discussing the present and the future of audio-visual communications were the *National Audio-Visual Association*, the *Industrial Audio-Visual Association*, the *A-V Workshop for Industrial Training Directors*, *A-V Conference of Medical and Allied Sciences*, *Agricultural Audio-Visual Workshop*, *Religious Audio-Visual Workshop* and the *Educational Film Library Association*.

New Committee

A Video Tape Recording Engineering Committee has been formed by the *Society of Motion Picture and Television Engineers* in order to help standardize video tape recording practices. Initially the committee plans to consider standardization in the following areas: tape (dimensions and identification), tape reels (hub and flange), tape tracks, recorded signal electrical characteristics, tape leaders, methods of measurement, terminology and tape splicing. Chairman of the committee is Howard A. Chinn of CBS Television.

Color Seminar

Over 70 people attended a color seminar given by the Manhattan School of Printing. Speaking on all phases of color reproduction and processing were Daniel Ford, P. F. Mallon Co.; Louis Greenwood, Young & Rubicam; Louis Happ, Snyder and Black; Fred Messner, Eastman Kodak; Herbert Paschel, Graphic Arts Consultant; Nat Rosen, Superior Printing Ink; and Gerald Smit, Eastman Kodak.

Space Age and Photography

The *Society of Photographic Instrumentation Engineers* annual meeting, July 20-31, in Chicago highlighted the uses of photography as a major research tool in the study of space travel and exploration.

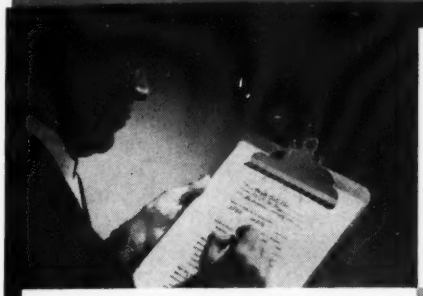
Nearly 1000 military and civilian scientific researchers heard reports on the latest developments in this field of photography. □

'Photographers in Industry" (Greater Pittsburgh) has announced its officers for 1958-1959. The officers and Directors are: Front row, left to right, Henry O. Navratil, President; Clifford E. Boden, Past President; Jack E. Engel, Vice President. Center row, Frank Ziegler, Historian; Michael Fedison, Director; Albert Levin, Director (Chairman). Rear row, Rev. Vincent DePaul Deer, Director; Richard D. Hutchinson, Treasurer; George R. Poellot, Secretary.

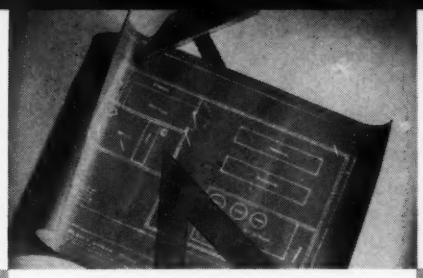
PLANNING A LAB?

Let Houston Fearless complete service help you every step of the way!

To function smoothly and efficiently, a motion picture film lab must be properly planned and equipped. The 30 years' experience of Houston Fearless in designing and building many of the world's finest installations (as well as operating their own color lab*) is at your service—from the purchase of a single piece of equipment to a complete laboratory system.

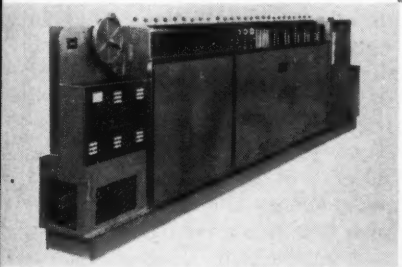


1 ANALYSIS OF YOUR NEEDS. The first step in planning your lab is to determine your present and future needs. After a thorough analysis, Houston Fearless engineers can plan objectively.

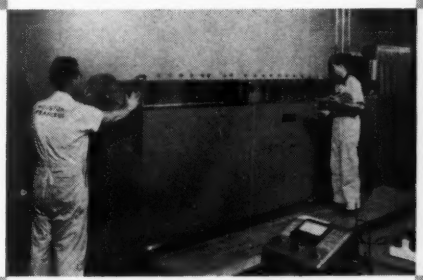


2 DESIGNING THE LAB. If desired, Houston Fearless will lay out your complete lab to meet your specific requirements—with peak operating efficiency in relation to the investment.

3 PROPOSAL. Based on many years experience, Houston Fearless will submit a specific proposal, recommending a complete system for your lab — whatever is best for your requirements.



4 PROCESSORS. Houston Fearless builds the widest range of processing equipment; 16mm, 35mm, 70mm, B&W, color, pos., neg., rev., spray-type, from 5 to 250 fpm or will custom design for your needs.



5 INSTALLATION. Complete Installation service is available. Performed by experts who know the equipment intimately and who thoroughly check it out and test-operate it for perfect performance.

6 PERSONNEL TRAINING. If required, Houston Fearless will train your technicians in the best operating and maintenance procedures—important for achieving maximum lab efficiency.

SERVICE AFTER SALE. Houston Fearless maintains a nationwide service organization.

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*In Burbank, California, Houston Fearless operates the Houston Color Film Laboratory where finest quality processing is done for the major motion picture studios as well as 16mm producers.

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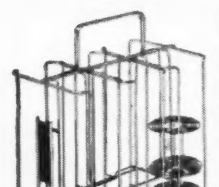
REEL RACK



For 35 mm, 120 and 620 Nikor reels. No reel center posts allows light to pass through reels to film for reversal. Fits any 3½ gal. tank. Type 316 S.S. All parts are welded. A rugged unit. Capacity: thirty 35 mm or eighteen 120-620 reels, or any combination without costly adapter. Has control strip film holder. $21.45.

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Radiography and Ultrasonics

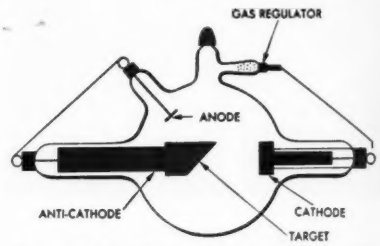
J. R. BRADLEY, Technical Consultant

Radiography is becoming more and more an indispensable tool of non-destructive testing methods. Time and experience have given to industry such radiation sources as X-ray, Cesium 137, Cobalt 60, Iridium 192 and radium; and the never-ending search by physicists and engineers is providing us with newer radio-isotopes (natural radioactive materials).

It all began back in 1895. On November 5 of that year, Professor Wilhelm Konrad Roentgen, professor of physics at the University of Wurzburg, discovered this new type of radiation. Prof. Roentgen was studying the nature of electric discharges in a partially evacuated pear-shaped tube, which contained a rarefied gas. During the experiment, he noticed a peculiar phenomenon in the presence of radiation emitting from the tube. Because no other scientist had ever approached the threshold of such an experiment, there was little hope for the identification of this new discovery. Roentgen used the algebraic unknown quantity symbol for this oddity and called it X-ray. The various uses of this peculiar ray could not have been imagined by Roentgen at that time. The thought of using these rays to detect flaws in metals, combat malignant growths in humans, detect and record on film the malfunctions of the human anatomy would have been as fantastic as the nature of the rays.

The discovery was made while Roentgen was experimenting in a darkened room. The experiment involved the glass tube, which had electrodes sealed in at each of the two ends of the tube. These electrodes were wired to the terminals of a high-voltage induction coil. The tube and electrodes were covered with black paper to insure a positive blackout condition. During the experiment, Roentgen noticed a faint greenish fluorescence on a piece of cardboard that had been impregnated with barium platinocyanide. Both sides of the cardboard responded to the X-ray beam. The card was moved a distance away from the source of radiation but the fluorescence persisted.

While picking up the barium coated cardboard, Roentgen noted the outline of tissue and bones of his fingers which were interposed between the tube and the cardboard screen. This was the beginning of exhaustive research which led to the modern methods of radiography used today in medicine and industry.



One of the first tubes used in radiography; these tubes were referred to as "gas" tubes.

Radiography utilizes the basic principles of photography. One difference is the light source. In radiography, variations in contrast, density and penetration depend upon the control of the rays emitted from the tube. These factors are controlled by variable means. The selection of desired kilovoltages and milliamperes allows the radiographer to obtain a radiograph worthy of interpretation. This selection is made possible by the use of an autotransformer in the electrical circuit (more detailed information on electrical components will appear in future articles). For the sake of clarification, reference is made to this light source as radiation.

Choice of Radiation Source

Industrial X-ray equipment is available in various output capacities .These capacities are rated in terms of KvP (Kilovolt Peak) and Ma (Milliamperes). One KvP equals a thousand volts; a milliampere equals .001 ampere. When an X-ray unit is referred to as a 100-KvP unit, it means that the machine is capable of delivering one hundred thousand volts output. There are

units available that are rated from 40 KvP to units producing several million volts. The 40 KvP machine is used in micro-radiographic studies in the field of metallurgy. The multimillion-volt unit is used in large casting inspection such as turbine casement and other exceptionally thick metals.

Radioisotopes

Radioisotopes are serving the need where portable and versatile sources of radiation are required. Cesium 137, Iridium 192, and Cobalt-60 are the most commonly used radioisotopes in the industrial field today. The numbers appearing immediately after the elements identifies the weight of one atom of the isotope. This is necessary so as to distinguish it from other isotopes of the same element or the parent element. In other words, the number would indicate any change from the normal stable atomic weight of the element. A deviation from the normal stable atomic weight occurs when the element is bombarded by neutrons from an atomic pile. The element is thereby radioactive and becomes a source of gamma radiation.

Half-Life Cycle

Radioisotopes differ from the X-rays in two different ways: First, they emit a gamma ray, whereas X-ray is of a short wave-length characteristic. Second, they are not stable for an indefinite period; there is a limit for the radioisotope to retain its productive radiation. This period is measured in terms of "half-life". The half-life of the radioisotope is the time required for it to lose one-half of its intensity. The half-life period varies with the element. Cesium 137, for instance, has a half-life of 27 years, while Iridium 192 lasts only 75 days.

It is very important that the radiographer be aware of the half-life value of these elements. With this information, he knows exactly what compensations must be made in exposure time. For example, the exposure time of Iridium 192 at the half-life period of 75 days would be double that required of the "fresh" isotope.

• • • • •

NEXT MONTH: *The production of X-rays. A basic schematic diagram of the X-ray circuit and how X-rays are generated.*

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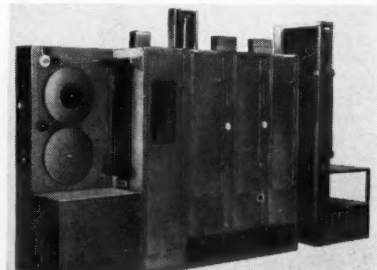
New Equipment and Materials

Keep posted on the latest developments in the photographic field. Each new product and supply item featured below has a key number. If you want more information on the subject — without any obligation — circle that same number on the Readers Inquiry Card on pages 81-82.

New Spray Processor 101

Filmline Corp. announces a new advance in rapid spray processing of 16mm and 35mm motion picture films with the introduction of the Model S-15OR. Requiring only minumum plumbing inlet and drain requirements, the unit is completely equipped and is simple to install or to disassemble for shipment. The unit processes 16mm negative and 35mm positive films at rates up to 150′ per minute. Speed adjustment is variable. The processor can be converted from 16mm to 35mm by flipping a film-flange lever. No adjustment or flange removal is necessary. Warm-up time is ten minutes, and a complete dry to dry processing cycle takes five minutes. The unit features the stress-less "Film-Flite" film transport system. All components in solutions rotate on nylon or stainless steel ball bearings.



The unit has separate refrigeration and heating, recirculation and replenishment systems for each of its two chemcial cabinets. Minimum solution requirement is six gallons. Dimensions: darkroom section-31″ long, 22″ wide, 89″ high; daylight section-105″ long, 32″ wide, 81″ high. Price completely equipped: $31,700.

Lettering System 102

Planoscope Corporation has perfected a new and fast lettering system called Plantotype. Made of a new plastic, Planotype makes it possible to compose copy in a matter of minutes producing lettering of professional quality. Planotype will stick to any smooth or textured material and leaves no residue when removed. It can be re-used many times. Planotype letters are available, opaque or transparent, in a variety of type styles, colors and sizes.

Color Printer 103

A new Roll Paper Color Printer, Type IVC-2, companion model to the Type IVC Printer, has been announced by *Eastman Kodak Company*. This new printer is designed to make 5x7 enlargements on Kodak Ektacolor Print Material from all standard sizes of Kodacolor negatives from 828 to 616. Accessory lenses will be available to make 5x7 prints from 35mm negatives. Lenses and parts will also be available separately to make 3½″ x 5″ prints from the smaller negative sizes crosswise on 5″ paper with the Type IVC-2 Printer. Price: $7450.

Camera Belt-Pod 104

A new aid for photographers called the Camera Belt-Pod is being introduced by *Photo Dynamics*. This sturdy, lightweight camera-rest clips on

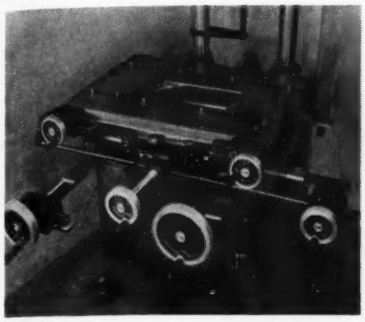
the front of the photographer's belt. A neck strap provides additional support. The Belt-Pod can be extended to a full 18″ and weighs 6¾ ozs. It clips into the belt when not in use. Price: $7.95.

Processing Tube 105

Quick, dry white copies of copy to be duplicated (up to 42″ wide) now can be made using an inexpensive machine that hangs on your office wall. Rotolite by *Rotolite Sales Corporation* is designed to use dry developing diazo paper, but may be used to expose moist developing diazo paper and blue print paper. Price ranges from $129.50 to 189.50.

Animation Compound 106

The Warren Conrad Portman Company is manufacturing an Animation Compound that features 19" north/south and 26" east/west movements which are completely ball bearing



mounted. The 20" x 28" mahogany table top has two peg tracks with 22" travel. The table top rotates 360°. It has a 9" x 12½" hole through it for rear projection. This compound may be used with any camera stand. Price: $1790.

Steamer Attachment 107

The Kodak Steamer Attachment, Model C, designed to reduce paper curl by providing a flow of steam to moisten the back of paper matte-dried or ferrotype on the Kodak Roll Paper Dryer-Glazer, Model C, has been announced by *Eastman Kodak Company*. The Steamer Attachment is an elongated brass chamber approximately 2" x 18" long and is furnished with 2 brackets for mounting on the frame of the Dryer-Glazer. Water, supplied from a small pan reservoir and controlled by a float-type needle valve, is converted to steam by a 500-watt, 230-volt heating element inside the chamber. Small perforations across the top of the chamber direct the flow of steam to moisten the paper as it is drawn over the steamer at a distance of about 1½". Price: $120.

Foil Board 108

Bulkley Dunton & Co. is featuring foil board which is available in 52" wide rolls. The product has high reflection to bounce lights. The board is made of heavyweight material and is easy to manipulate. It is said that the material is well-suited for achieving special effects.

Film Striping Machine 109

S.O.S. Cinema Supply Corp. has announced the development of the SOSound Magnetic Film Striping Machine for 8mm and 16mm films. The machine incorporates the bead application system. Sound continuity is unaffected by film splices. It features a capacity of 2,000-2,200 ft. per

continued on page 70

You get top quality, durability, advanced design with

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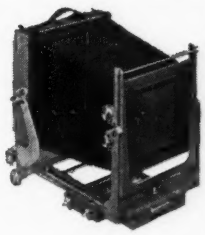
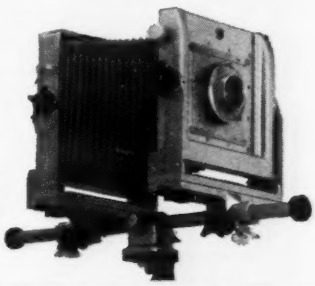
CALUMET 8x10 VIEW CAMERA



Rigid, all-metal, with swings, slides, 6 x 6 lens board. Compact when folded. For studio, on location.

CALUMET 4x5 VIEW CAMERA



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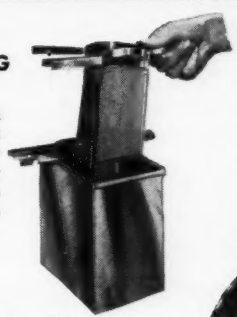

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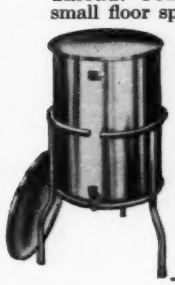

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LIFE-SIZE, ONE-TO-ONE VIEWING IMAGE
for "normal" and telephoto lenses: 50, 85, 105 and 135mm

WIDE ANGLE OPTICAL FINDER
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pre-selects the lens to use

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Industrial Photography

VOL. 7, NO. 10 OCTOBER, 1958

A WORD ABOUT "ACCOUNTING"

We were privileged recently to report on the organization and operations of GENERAL MOTORS PHOTOGRAPHIC. The department certainly must rate as one of the country's best organized and most successful industrial photographic installations.

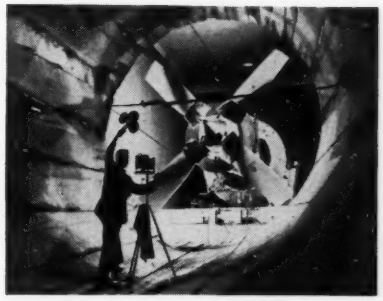
I asked Phil Filmer, GM's veteran manager of some 30 years, what factors had contributed most to the success and growth of the division. He placed high on the list the early practice of keeping a business-like accounting of department costs and savings. The department today has quite an elaborate accounting system which would be applicable to only a few of the country's largest operations. But Phil pointed up a lesson which even the smallest department might profit from. It is simply this . . . management will respect the photographic department more if it is presented with "facts and figures" evidence of the department's efficient and cost-saving contribution to overall company operations. This is especially true during those periods when costs and budgets are being closely scrutinized.

A photographic division might do well to prepare its own annual report of job accomplishments and savings in terms of both cost and time. Call it "apple polishing," if you wish. But with solid facts and figures to stand on, the department will be in better shape to argue for and get added equipment and responsibility and recognition.

Jim Watkins

Publisher

COVER PHOTO



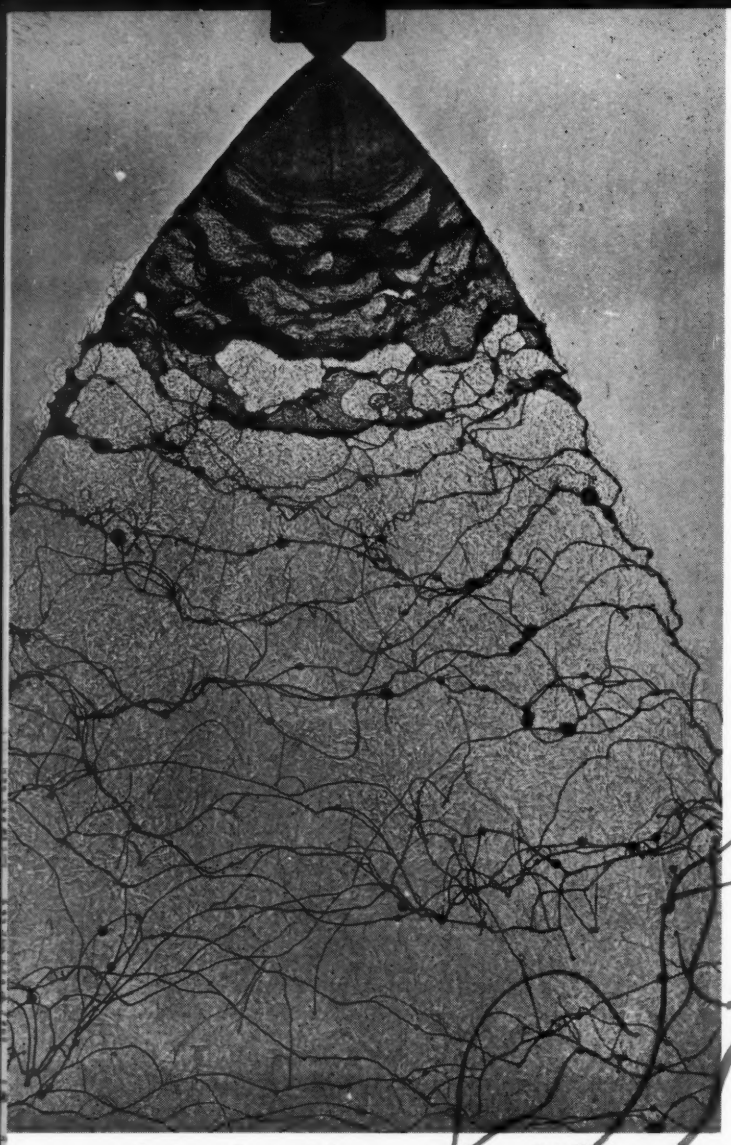
Hamilton Standard of Windsor Locks, Conn., a division of United Aircraft Corp., is the world's largest manufacturer of aircraft propellers and a major user of industrial photographic services. The cover photo, made by Hamilton's James Tourville, shows his fellow in-plant photographer, William Sieber, making an engineering record shot of a propeller prior to an endurance run in a test cell.

PHOTO CREDITS

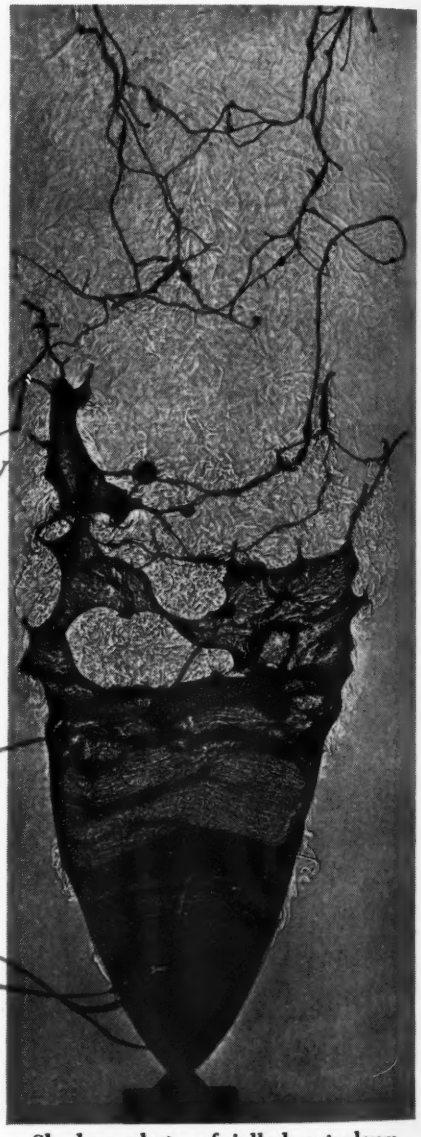
Pages 18 and 19, Imperial College of Science and Technology, London, England; Pages 21, 22 and 23, Veterans Administration Hospital, Buffalo; Page 28, The Port of New York Authority, New York; Page 30 and 31, Tecnifax Corporation, Holyoke, Mass.; Page 32, Keuffel & Esser Company, Hoboken, N.J.; Page 34, United States Steel Corporation, Pittsburgh; Page 38, Corporate Communications, Whirlpool Corportaion, St. Joseph, Mich.; Pages 40 and 41, Woods Hole Oceanographic Institution, Woods Hole, Mass.

PHOTOGRAPHIC

by JAMES HUGHES
Executive Editor

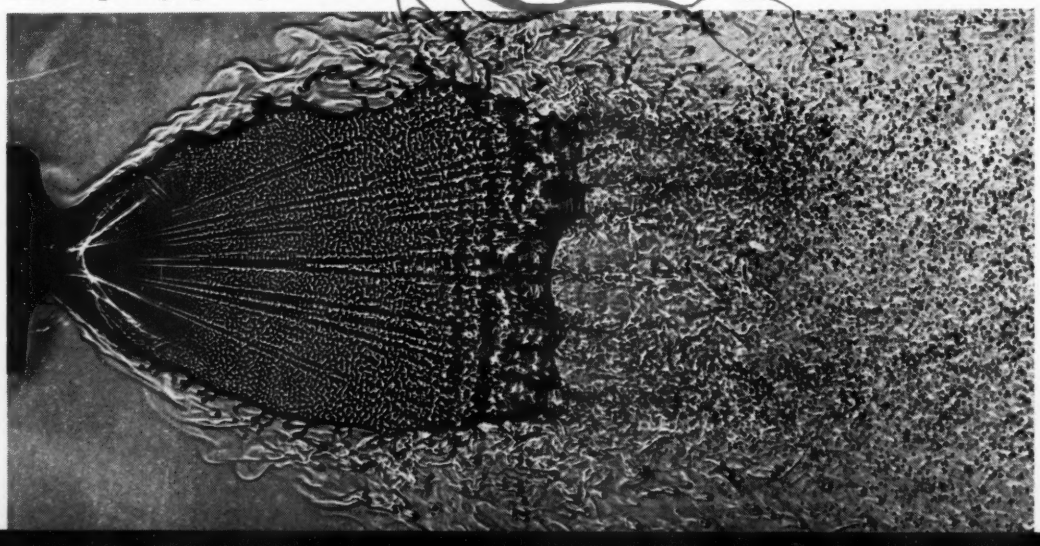


Shadow photo of fan spray. Sheet of jelled petroleum showing thread formation. When petroleum is jelled there are some instances where drops are not formed.



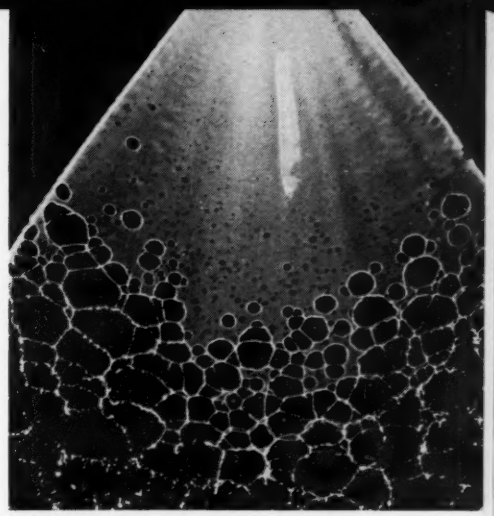
Shadow photo of jelled petroleum.

Shadow photograph of petroleum fan spray sheet.



SPRAY ANALYSIS

Techniques enabling scientists to study disintegration of liquid sheets are paving the way for improved fuel atomizers, insecticide dispensers and other products.



Disintegration through perforation with a soluble oil/water emulsion.

A means of controlling the drop size of liquid sprays has become more and more desirable in many industrial applications. The greater use of insecticides with residual effect, for example, has stimulated interest in the performance of spray nozzles. In oil firing there is a greater need for more powerful atomizers to deal with fuels of higher viscosity.

To obtain a greater understanding of the drop-forming mechanism, R. P. Fraser and N. Dombrowski of the Imperial College of Science and Technology, London, have developed photographic techniques to study the disintegration of liquid sheets. The behavior of liquid sheets is recorded as they become unstable and disintegrate into droplets. The sheets studied were produced from rectangular orifice fan spray nozzles and from spinning disks.

During the projection and disintegration of a liquid sheet, the fluid usually achieves a velocity of between 50 and 400 ft./sec. It may undergo rapid changes before it finally disintegrates into drops varying from fine to 300 microns.

Because spray drops of average size may travel as much as one hundred times their own diameter in a time span of 500 microseconds – the duration of the fastest mechanical camera shutters – the sheets were photographed by a light flash of short duration.

Two Mullard LSD2 Arditron flash tubes were mounted in reflectors behind diffusing glasses and connected in series with two $2\mu F$ condensers. The condensers were charged to 7.5 kv. from a laboratory power pack. A single flash was obtained by means of a trip switch.

Various methods of illumination were employed although incident lighting was generally preferred to transmitted light, since a clearer picture is obtained of the nature of the surface of the liquid sheet as it leaves the orifice and as it subsequently disintegrates.

The incident method requires a considerable quantity of light because it requires a lens and a small aperture is needed to achieve the necessary depth of field. With the system used, this results in a relatively long effective flash duration, which in turn imposes a limit to the definition obtained of the small, fast-moving drops.

A seven-inch $f/5.6$ Dallmeyer Enlarging Anastigmat lens operating with an image-object magnification of 2 and an effective aperture of $f/40$ formed one of the photographic optical systems. It gave a depth of field of 0.022 inches which, when used with Ilford Press Ortho Series II plates, resolved particles of 15 microns in diameter.

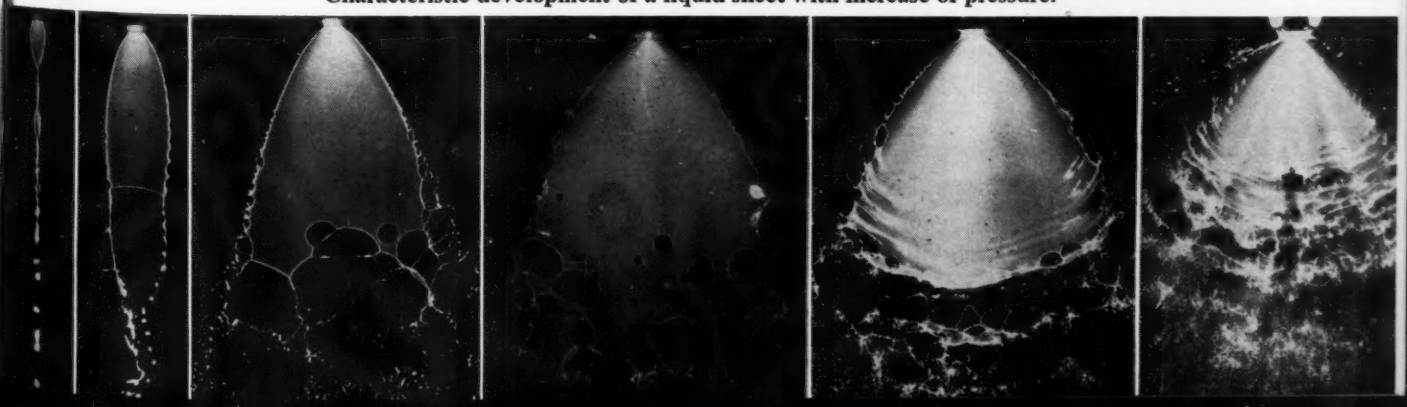
To obtain gas-free liquids under controlled conditions for photography, they were supplied under pressure to the spray nozzle from a flexible bag which was acted on by compressed air from outside the bag. For spraying mercury, an all-steel apparatus was employed. Liquid metals such as sodium were sprayed into a closed vessel filled with carbon dioxide and photographed through a window.

Photographs were taken of a wide variety of liquids sprayed from the same type of spray nozzle to compare the influence of pressure with variations of viscosity, surface tension and density.

Study of the photographs disclosed that the formation of ligaments or threads in the sheets is a necessary stage before the production of drops. The threads can be formed directly from any free edge, which is formed when equilibrium exists between surface tension and inertia forces, or in the boundary of the sheet. Threads of approximately uniform diameter produce uniform drops, but the irregular areas of liquid which occur when a number of holes in the sheet expand towards each other produce a wide variety of drop sizes.

□

Characteristic development of a liquid sheet with increase of pressure.



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1606

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By HAROLD C. BAITZ, F.B.P.A.
Chief, Medical Illustration Service
Veterans Administration Hospital, Buffalo, N.Y.

Diazotype Film Aids Biologists in Microscope Research

This article on a scientific application of diazotype film leads off a special section on current uses of diazotype and blueprint materials.

A photographer, receiving an assignment to make photomicrographs, needs information as to location of the area of interest on each microscope slide, the object or structures to be centered and the boundaries or extent of the specimen area to be included in the photograph.

From this information, in addition to knowledge of the resolving power required, he can select the best combination of objective and eyepiece lenses for photography, which may be different from those used for visual examination because of considerations of depth of field, flatness of field, and color correction.

The examination of a microscope slide often takes considerable time, and various methods have been used to mark, record or otherwise designate a slide area for future relocation. A mark of microscopically accurate size and placement is desirable.

In the marking procedure to be described, a small piece of photo-sensitive diazotype film is taped in contact with the top surface of the microscope slide or cover glass. The film directly above the selected microscopic field is exposed to an intense spot of light concentrated on it by the substage condenser. The film is dry developed

by holding the slide so that ammonia fumes will pass over the film. The exposed spot remains clear, the rest of the film darkens and becomes sufficiently developed in about a half minute. The clear spot may be as small as needed to indicate an object viewed under the highest power.

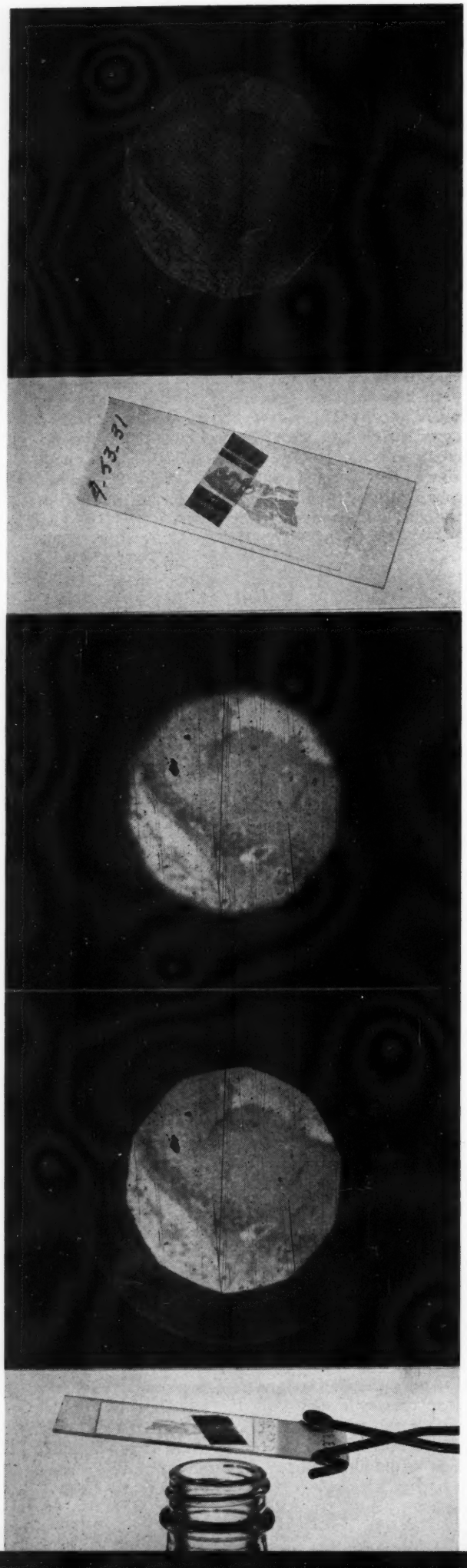
Ozalid Viewfoil Black 101 X is one of the diazotype films with suitable characteristics, and may be obtained inexpensively in 5 x 7 inch or larger sheets, .005 inch in thickness.

The film has very low sensitivity to light and may be handled under average incandescent light, and subjected to microscope illumination ordinarily used for viewing without being noticeably affected.

Practical application of the method requires that small pieces of film with tape adhering be prepared in advance for convenient handling and attachment to the microscope slides. The sensitized surface is abraded lightly or coated with microscopic particles of ink so that it can be focused upon under the microscope.

Preparation of Film Tabs

Cover the entire sensitized surface of a narrow strip diazotype film with fine scratches, by rubbing with a soft material such as a pencil eraser. Attach two strips of drafting or masking tape, adhesive side to the film *base*, as shown in figure 2.



For use on slides prepared without cover glasses, attach the tape to the sensitized surface of the film. Instead of scratching the sensitized surface, paint it with a dilute wash of India ink, water, and Braun non-crawl color medium. Mark the tape with a line to indicate sensitized side up.

Cut small tabs of assembled film and tape. Place across ridges or wire mesh in a box for easy removal as shown in figure 3.

Illumination

A microscopic lamp equipped with a field diaphragm, and providing intense, even illumination gives best results. The intensity is reduced for visual use by a filter placed in front of the lamp diaphragm. The filter may be in separate holder for easy removal from the path of light. It should be perpendicular to the beam to avoid deflection. A light source great enough to require a neutral density 2.0 filter (factor 100x) for comfortable visual microscopy is desirable. The microscope and the lamp are accurately aligned and adjusted for Koehler illumination.

The substage condenser forms an image of the lamp diaphragm aperture in the plane of the microscope specimen. The minimum size of field indicating spot that can be produced on the diazotype film is determined by the optical correction of the substage condenser lens system, and the smallest aperture to which the lamp iris can be closed.

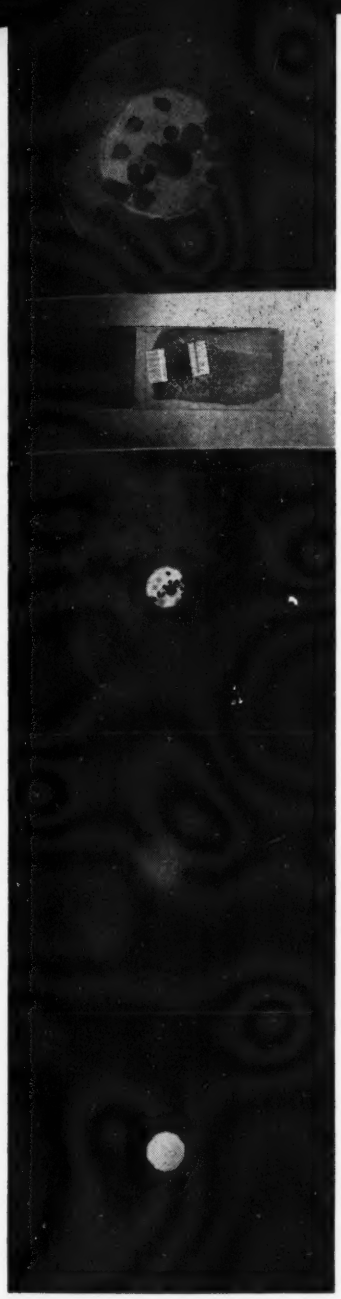
Slide Marking Procedure

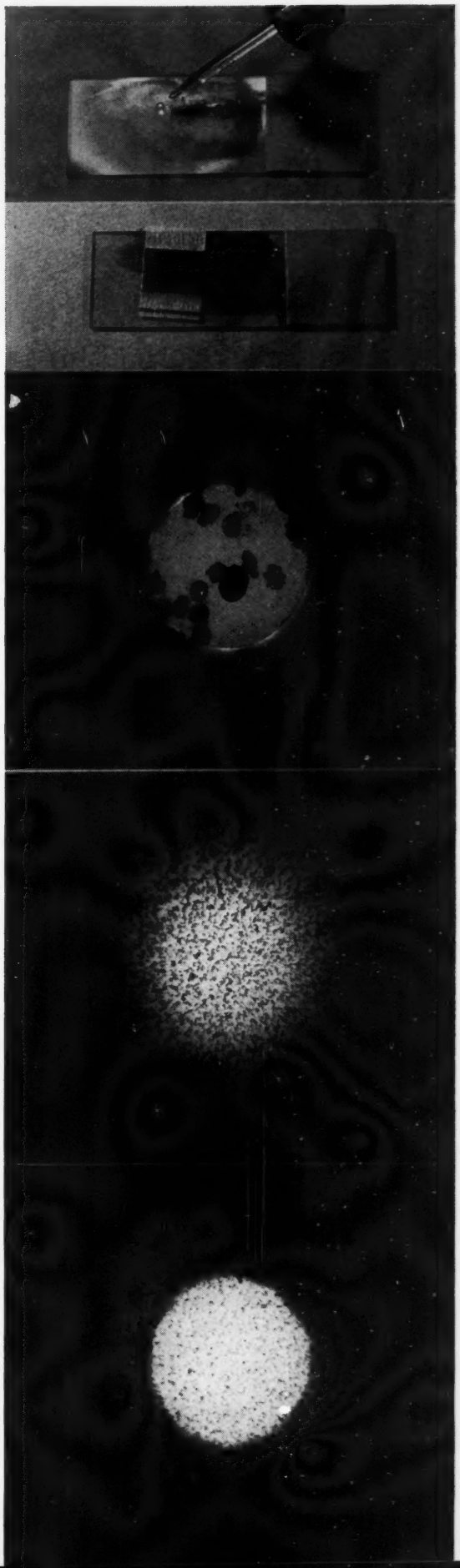
One purpose of this method is to make it possible for the microscopist to accurately mark high power as well as low power microscope slide areas. Brief notations specifying structures to be focused upon or emphasized in photomocrography may accompany a marked slide. If the fields are selected at the photomicrographic microscope by the microscopist, they can be marked rapidly by the photographer, who can develop the film on one slide while the next slide is being investigated. Slide marking procedures are given on the three illustrated charts to follow. It is recommended that a procedure chart or charts be kept for reference at the microscope to be used.

The procedure chart on this page of a section of a heart valve gives data for marking areas view-

continued on page 58

TO MARK LOW POWER FIELDS (1) focus image of lamp (field) diaphragm on specimen by movement of substage condenser. Adjust field diaphragm to illuminate only selected area. (2) Attach diazotype film, sensitized side down, over selected area. (3) Focus microscope on scratched film surface. (4) Rack substage condenser upward to focus field diaphragm on scratched film surface. (5) Expose the selected spot on film to intense light by removing all filters from illuminating system for 15 secs. to 1 minute. (6) Develop for 30 secs. in ammonia fumes.





TO MARK HIGH POWER FIELDS (1) focus lamp (or field) diaphragm image on specimen by movement of substage condenser; adjust lamp diaphragm opening to illuminate only subject matter of interest. (2) Attach film, sensitized surface down, to dry slide. (3) Change to low power objective. Check centering of subject. (4) Focus on scratched film surface. (5&6) Raise substage condenser to focus lamp diaphragm image on film and expose unfiltered microscope illumination to full intensity for 15 to 31 secs. (7) Develops 30 secs. in ammonia fumes.

TO MARK FIELDS ON A SLIDE PREPARED WITHOUT A COVER GLASS (1) apply immersion oil sparingly. (2) Attach film, sensitized surface up, so that oil spreads in contact with film base. Film serves as cover glass. Use dry or oil immersion objectives. (3) Focus image of lamp (or field) diaphragm on specimen by movement of substage condenser; adjust lamp diaphragm opening to illuminate area. (4) Focus microscope upward onto finely dispersed India ink particles covering sensitized film surface. (5&6) Rack substage condenser upwards to focus lamp diaphragm image on film. Expose unfiltered microscope illumination to full intensity for 15 to 30 secs. (7) Develop 30 secs. in ammonia fumes.

A Very Unusual Assignment

The photo assignment that looks simple when it starts and then grows more and more complicated as it goes along is an everyday occurence for business photographers. A case in point is a recent job completed by Warren Siegmond for Lanvin perfumes.

Lanvin's trademark for "My Sin" is a black cat, which appears in all of its advertisements. Siegmond's job was to work up both a new series of stills of the cat and a ten-second filmed television commercial.

For the still, he envisioned the proverbial picture of the black cat on a coal pile at midnight – something dark and mysterious with two piercing eyes cutting through the depths. For the commercial, the thought was to show a live black cat with a zoom into its brain where the bottle and its label "My Sin by Lanvin" would take form, superimposed optically. Equipment consisted of a Rolleiflex with an *f*/2.8 lens, a Nikon with an *f*/3.5 Mikro Nikkor lens, a rented 16mm Arriflex with a Zoomar lens, and a few reflector floods. It sounded simple.

Finding the right cat presented problems but difficulties really began when "Midnight" was placed on a black velvet pillow, against a black velvet background, under the lights. Shooting on the commercial began with the cat absolutely motionless. As Siegmond began filming his long shot – hoping to zoom in to a closeup in which only the space between Midnight's eyes filled the screen – she leaped off the pillow and began attacking some specially prepared kidneys.

Three hours later, Siegmond was still without a second's worth of film. Every time the cat moved as little as a sixteenth of an inch during the zoom, a half-hour was lost in soothing, pleading and coaxing. In a full, exhausting night's work, the results were two perfect takes on a 100′ roll of Tri-X. The cameraman considered himself lucky indeed.

The stills were taken, naturally, on another day. Midnight was placed on a sofa and illuminated by available light from a nearby fireplace. A Rolleiflex at 1/125 second at both *f*/8 and *f*/11 with Tri-X – plus infinite patience and cajoling – produced the shots.

Shooting the perfume bottle was much simpler. It was placed on black velvet and lit by two photofloods, one directly on it and the other skimming it for highlights. A slight hole was made in the black velvet under the bottle so that just a trace of light could sneak through.

The stills and films were immediately accepted and were the foundation of the advertising campaign within weeks. The highest compliment on the job has come from Edouard Cournand, president of Lanvin, Inc., who says, "The eyes follow me wherever I go. I have the feeling that cat is going to jump out of the frame at any moment!"

Taking photographer Siegmond's experiences with Midnight into consideration, it's not impossible.

DIAZO

The "Diazo Product & Producer Directory" is based on a survey of manufacturers of diazotype, blueprint, brownprint, and wash-off materials conducted by the National Association of Blueprint and Diaoztype Coaters. From the information gathered by the NABDC and reports received from leading manufacturers, INDUSTRIAL PHOTOGRAPHY has compiled a directory which will be of vital interest to all in-plant photographic departments.

In compiling the types of diazotype materials manufactured, it was necessary to eliminate the variety of colors each material comes in because of space limitations. The editors, however, will be pleased to supply this information upon request.

PRODUCT AND PRODUCER DIRECTORY

PRODUCERS	BLUE-PRINT			WASH-OFF			BROWN-PRINT				
	Opaque Paper	Opaque Paper Plastic Coated	Opaque Cloth	Translucent Paper	Translucent Cloth	Transparent Film	Opaque Paper	Translucent Paper	Opaque Cloth	Translucent Cloth	Transparent Film
Acme Reproduction Supplies	X										
Adelphi Research & Mfg. Co.	X		X				X	X			
Azon Corp.											
Azon West Coast											
Charles Bruning Co.	X	X	X	X	X		X	X	X		
Buffalo Blue Print Co.	X		X				X	X	X	X	
The H. Cole Co.	X										
Cushing & Co.	X										
Defiance Sales Corp.	X	X	X				X	X	X		
Dieterich-Post Co.	X		X				X	X	X		
Eugene Dietzgen Co.	X		X	X	X	X	X	X	X		X
B. K. Elliott Co.	X	X			X		X	X	X		
The Huey Co.											
The K-C-B Co., Ltd.	X		X				X	X	X		
Fred E. Klingler Co.											
Phomat Corp.											
A-B-Coaters											
Keuffel & Esser Co.	X	X	X	X	X	X	X	X	X		X
Keystone Blue Print Paper Co.	X	X	X				X	X	X		
J. H. Weil & Co.	X	X	X	X	X		X	X	X		
Dyline Co.											
Ozalid Division General Aniline & Film Corp.											
Salt Lake Blue Print & Supply Co.	X		X								
The C. F. Pease Co.	X							X			
The Frederick Post Co.	X		X	X	X		X			X	
Reproduction Products Co. Detroit, Mich.	X	X					X	X			
Reproduction Products Co. Franklin Park, Ill.	X	X									
L. L. Ridgway Co.	X	X	X	X	X	X	X	X	X		
Royal Blue Print Co.	X	X					X				
San Diego Reproduction Products Co.	X	X	X								
Solar Products, Ltd.	X		X				X	X			
Chas. W. Speidel & Co.	X		X				X	X	X		
Tecnifax Corp.											
United States Blue Print Paper Co.	X										
Weber-Valentine Co.	X		X				X	X			
Blue Print Paper Co. Detroit, Mich.	X										
Blue Print Paper Co. Seattle, Wash	X										

PRODUCERS

MOIST DIAZO

	Diazo Papers Opaque Black	Diazo Papers Translucent Sepia	Diazo Papers Plastic-Coated	Diazocloth Opaque Black	Diazocloth Translucent Sepia	Diazofilm Transparent	Diazo Glass-Cloth	Diazofilms, Dimensionally Stable Sepia	Reflex Materials
Acme Reproduction Supplies									
Adelphi Research & Mfg. Co.									
Azon Corp.	X	X							
Azon West Coast	X	X							
Charles Bruning Co.	X	X		X	X	X	X	X	X
Buffalo Blue Print Co.									
The H. Cole Co.									
Cushing & Co.	X	X							
Defiance Sales Corp.									
Dieterich-Post Co.	X	X							
Eugene Dietzgen Co.	X	X		X				X	
B. K. Elliott Co.	X	X							
The Huey Co.	X								
The K-C-B Co., Ltd.	X	X							
Fred E. Klingler Co.									
Phomat Corp.	X								
A-B-Coaters	X	X							
Keuffel & Esser Co.	X	X	X	X	X	X		X	
Keystone Blue Print Paper Co.									
J. H. Weil & Co.	X	X		X					
Dyline Co.	X			X	X				
Ozalid Division General Aniline & Film Corp.									
Salt Lake Blue Print & Supply Co.									
The C. F. Pease Co.									
The Frederick Post Co.	X	X							
Reproduction Products Co. Detroit, Mich.	X	X							
Reproduction Products Co. Franklin Park, Ill.	X	X							
L. L. Ridgway Co.	X	X		X					
Royal Blue Print Co.	X								
San Diego Reproduction Products Co.									
Solar Products, Ltd.	X	X							
Chas. W. Speidel & Co.	X	X							
Tecnifax Corp.	X	X						X	
United States Blue Print Paper Co.									
Weber-Valentine Co.	X	X							
Blue Print Paper Co. Detroit, Mich.									
Blue Print Paper Co. Seattle, Wash									

DRY DIAZO

Diazo Papers Opaque	Diazo Papers Translucent	Diazo Papers Plastic-Coated	Diazocloth Opaque	Diazocloth Translucent	Diazofilms Reproducible	Diazofilms Projection	Diazofilms Process	Diazo Microfilm	Diazo Glass Cloth	Diazofilms Dimensionally Stable	Diazoplastic Opaque	Sensitized Scribe Materials	**PRODUCERS**
X													Acme Reproduction Supplies
X	X												Adelphi Research & Mfg. Co.
X	X	X											Azon Corp.
X	X												Azon West Coast
													Charles Bruning Co.
													Buffalo Blue Print Co.
X													The H. Cole Co.
X	X												Cushing & Co.
													Defiance Sales Corp.
X	X												Dieterich-Post Co.
X	X	X	X	X	X				X	X		X	Eugene Dietzgen Co.
X	X		X	X	X					X			B. K. Elliott Co.
X	X												The Huey Co.
X	X												The K-C-B Co., Ltd.
X	X												Fred E. Klingler Co.
X	X												Phomat Corp.
X	X												A-B-Coaters
X	X	X	X	X	X	X	X	X	X	X	X	X	Keuffel & Esser Co.
													Keystone Blue Print Paper Co.
X	X	X											J. H. Weil & Co.
X	X	X	X	X									Dyline Co.
X	X		X	X	X	X	X	X	X	X	X		Ozalid Division General Aniline & Film Corp.
													Salt Lake Blue Print & Supply Co.
X	X												The C. F. Pease Co.
X	X		X	X	X	X	X	X			X	X	The Frederick Post Co.
X	X		X	X	X	X	X	X	X	X	X		Reproduction Products Co. Detroit, Mich.
X	X												Reproduction Products Co. Franklin Park, Ill.
X	X	X	X	X						X			L. L. Ridgway Co.
X	X												Royal Blue Print Co.
													San Diego Reproduction Products Co.
X	X												Solar Products, Ltd.
X	X		X										Chas. W. Speidel & Co.
X	X	X	X		X	X	X	X		X	X		Tecnifax Corp.
													United States Blue Print Paper Co.
X	X		X	X									Weber-Valentine Co.
													Blue Print Paper Co. Detroit, Mich.
													Blue Print Paper Co. Seattle, Wash

By the Numbers!

Port of New York Authority turns out over two million feet of diazo engineering reproductions annually; uses process to cut costs, speed planning and publicity.

A member of the Port Authority's Visual and Reproduction Services Division passes engineering drawings through an Ozalid Printmaster installation.

by RALPH SELITZER
Assistant Editor

Diazo is playing an important part in helping to develop and maintain one of the world's largest ports – the Port of New York.

The diazo process for making reproductions is used by the Port of New York Authority to reproduce over two million square feet of engineering drawings yearly. These drawings are used by the Bi-State Agency's engineering department in conjunction with its extensive construction program and maintenance operation at land, sea, and air terminals in the Port of New York.

Bi-State Agency

The Port of New York Authority is the self-supporting corporate agency of the States of New Jersey and New York. It was created in 1921 by treaty between the two states to deal with the planning and development of terminal and transportation facilities, and to improve and protect the commerce of the Port District.

The Port Authority's visual and reproduction services division reproduces the engineering drawings on two 42-inch Ozalid Printmasters with 75 watt per inch Mercury Vapor Lamps. The unit operates automatically. All the operator does is feed the original drawings and diazo-sensitized paper through the machine making sure that the proper dials have been set. Exposures vary with the type diazo paper used and with the quality of the original drawing. The Authority uses diazo black & white and sepia intermediate papers. Other types of paper are used for specialized jobs.

Diazo is the chief reproduction process employed by the Port Authority for engineering drawings because of its speed and economy. Small orders are generally completed the same day while larger jobs are scheduled accordingly.

The Port Authority not only reproduces engineering drawing through the diazo process, but also duplicates general business reports for staff use.

Diazo is also used for duplicating pages to be contained in publicity kits. The economy factor in diazo reproduction is an important consideration for the New York Port Authority since one of the Authority's chief functions is to publicize the vast facilities of the Port of New York.

Distribute Press Kits

For example, the Port Authority distributed press kits on the opening of the second deck of the George Washington Bridge. It had also distributed kits to insurance underwriters regarding insurance premiums for the second deck. In the kit, the Authority explained the construction details of the second deck, its safety features and why it is a low insurance risk. More than 500 kits were distributed. Over 1500 square feet of Ozalid prints were reproduced by the duplicating division as a portion of this literature package given to each underwriter. The kit included slides and a fifteen page booklet. □

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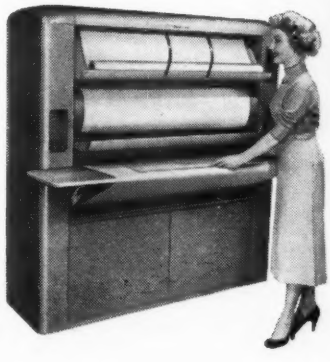

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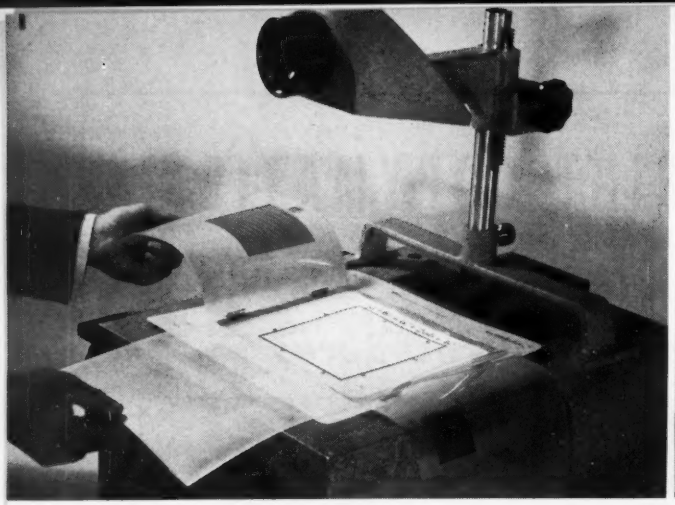
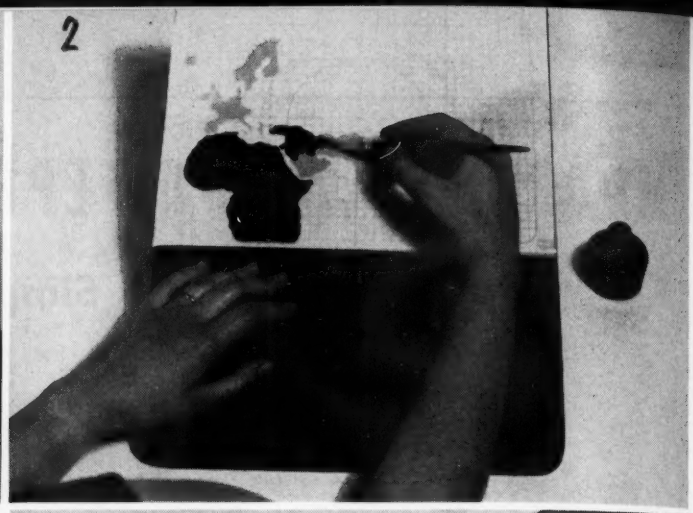
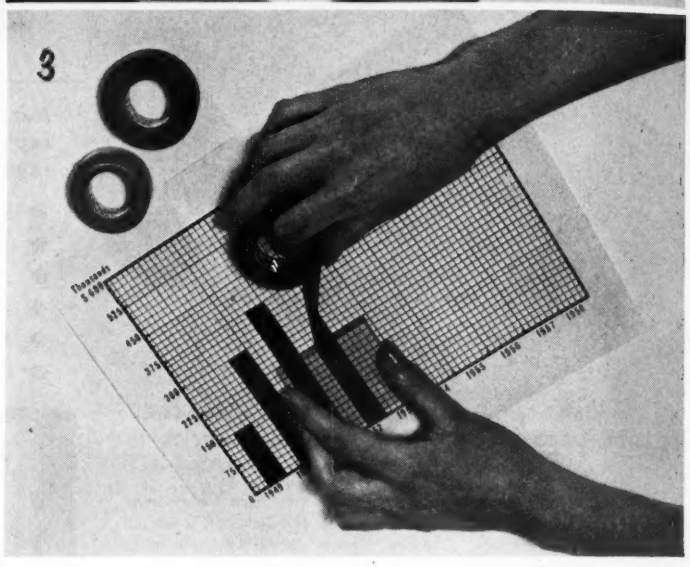
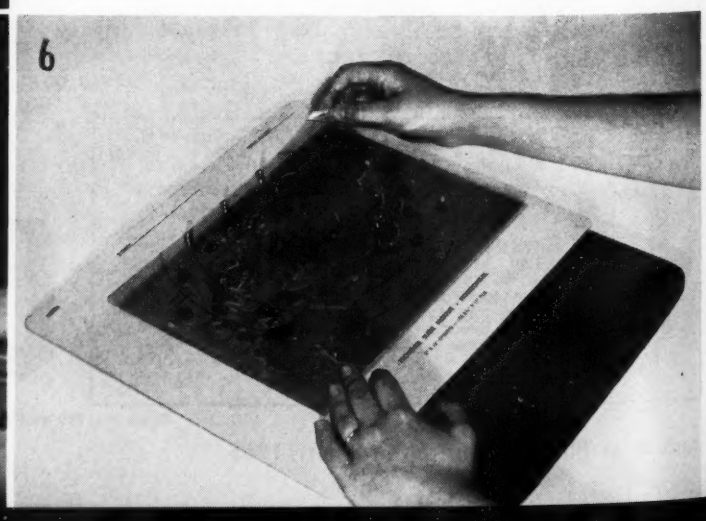




(1) The overhead projector which uses slides produced from diazotype color films is an unusually flexible device for communication. (2) Masters are prepared on translucent drafting paper. Through simple color separation techniques, it is possible to prepare overlays in various colors. (3) Easy-to-use "art aids", such as pressure-sensitive tapes, make it possible to produce good looking slides without extensive artwork.



(4) If the subject is printed or drawn on an opaque paper, it can be transferred to a translucent base by means of photo-copying, photography or Xerography. (5) Prints are made by superimposing the master over a sheet of film and passing the combination through a diazotype (whiteprint) machine of the type used for the reproduction of engineering drawings or office duplicating. (6) Film overlays are registered and mounted to form a multi-color slide. A pin-registration system of the type used for animated cartoons provides perfect registration.



Allies In Teaching

The combination of the overhead projector and slides produced from diazotype color films has proven a flexible aid for the communicator.

by L. K. HAMILTON
Vice-President, Sales
Tecnifax Corp.

In recent years it has become increasingly apparent that systematic use of "visual communication" — employing pictures to supplement word-symbols — produces faster, more thorough understanding of ideas than the exclusive use of word-symbols, either visual or aural. The rapid acceptance of visual techniques is demonstrated by the accelerated use of slides, film strips, flip charts, flannel boards and motion pictures. The overhead projector — a newcomer on the visual scene — is winning rapid acceptance as an unusually flexible device for communication. Most of the overhead projectors now in use are manufactured by three companies: Charles Beseler Company, East Orange, N.J., ("Vu-Graph" Projectors); Projection Optics Company, Rochester, N.Y., ("Transpaque" Projectors); and Victorlite Industries, Los Angeles, Cal., ("Visual-Cast" Projectors).

There are several reasons for the increasing use of overhead-projection technique for staff meetings, executive briefings, training and for other activities requiring efficient communication. Whereas most other projection techniques tend to *replace* the speaker while they are in use, the overhead projector *complements* his efforts. At all times he controls his mechanical assistant and takes a prominent part in the presentation. There is no need for a separate projectionist and an accompanying system of signals and instructions from speaker to projectionist.

The optical system of the projector permits placing it close to the screen, thereby making it possible to project slides from the front of the room. Since the image is projected over the shoulder of the speaker, he faces his audience at all times. A high light-output provides excellent screen visibility without darkening the room. With the audience in full view, the speaker can observe the reactions and adapt his program to meet the response of the viewers. He selects his own pace, extemporizing as he wishes, commenting before, during and after projection of a slide. He can alter the sequence of slides, or return to a previously-shown slide without awkward instructions to an assistant.

Can Use Many Colors

Several sheets of film are easily superimposed on the large, horizontal projection "stage", permitting many colors to be used to identify different elements of the projected image. The speaker can unmask transparencies in progressive disclosure of information, or build up several components into a composite image. Slides are large in size — 8" x 10", 7" x 7", 5" x 5" — which simplifies the preparation of artwork. In most cases, photographic reduction of the original artwork is not necessary. Rudimentary art skills — which anyone can acquire quickly — can produce dramatic, colorful, professional-looking slides.

Slides are usually produced from diazotype color films which are especially designed to take advantage of the versatility of the overhead projector. These films are available in black and 10 vivid colors at a nominal cost per sheet. Diazotype color films are members of the family of diazotype reproduction papers, cloths and films. These materials reproduce anything written, drawn or printed on a translucent material, such as tracing paper, tracing cloth or film. Diazotype color films are manufactured by Tecnifax Corporation, Holyoke, Mass. "(Diazochromes"); Ozalid Division, General Aniline and Film Corporation, Johnson City, N.Y. ("Ozachromes"); and Charles Bruning Company, Mount Prospect Ill. ("Copyflex Films").

The originals for diazotype transparencies are usually "line" artwork. Well-prepared translucent originals, such as pencil or ink drawings on tracing paper or tracing cloth, carbon-backed typewritten material and photographic film positives, produce clean, colorful transparencies. If the subject matter for the slide is printed, drawn or typed on opaque material, it can be transferred to a translucent base through photography or xerography, or by using one of the office photo-copying machines manufactured by such firms as Contoura-Constat, APECO, Peerless, Copease and Hunter.

Preparation of originals is simplified by many readily-available, easy-to-use "art aids", such as "cold

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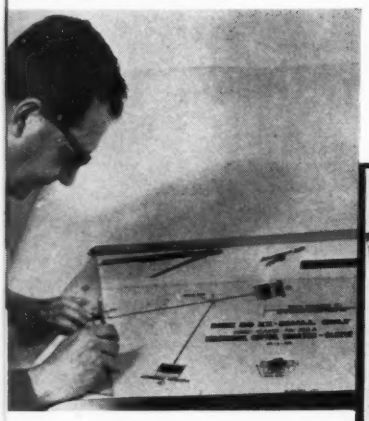

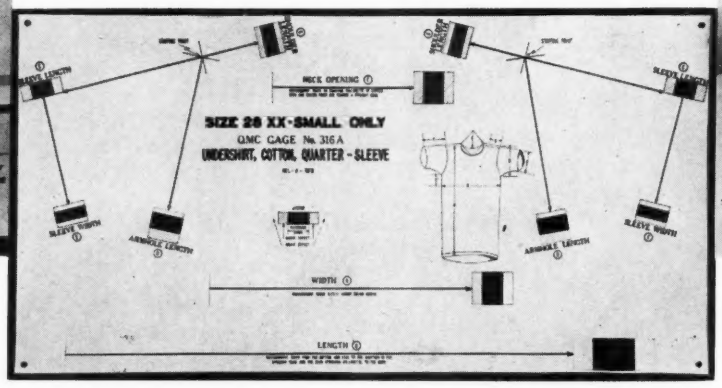

Low Cost Inspection Gage

by **MITCHELL M. BADLER**
Managing Editor

The use of a new type of photo-reproduced inspection gage is helping the U. S. Army Quartermaster Corps make sure that members of the Armed Forces are properly uniformed.

One of the major jobs of the QMC is to continually improve inspection techniques and maintain quality control of the manufacture of clothing procured by the Military Clothing and Textile Supply Agency for all the Military Services. When the range of sizes among military men is considered, this becomes a complicated job.

The Army green coat, for example, is subject to as many as 90 separate size schedules when all possible combinations of long, short, regular, stout and portly are calculated. The same holds true for every other item of military clothing.

Originally, cloth or steel tapes were used to measure dimensions and to compare these readings one after another with specification requirements. It was a time-consuming and laborious process. Then a study was initiated which resulted in a finding that most of the inspection measurements for any single garment could adequately be contained in a single gage or template.

Once the QMC study had demonstrated the feasibility of combining measurements into gages, the next step was to design inspection tools. These fell into two categories: flat units for checking width and length, and contoured templates for verifying shapes, such as coat fronts or caps. These gages and templates show the exact specification measurement, the plus or minus limits that constitute a minor defect and the offsize measurement that constitutes a major defect.

The original material selected for making inspection tools was standard rigid vinyl, the contour templates silk screened on a thick stock and the flat gages silk screened on a thinner stock. These proved to be less than ideal for a number of reasons.

First, the vinyl plastic became embrittled at cold temperatures and was subject to cracks and breakage out of doors as well as a tendency to tear. When the thickness of the plastic was increased to minimize tearing, portability was sacrificed. Finally, the end product was expensive to make, averaging about $3.60 per square foot.

All these reasons led to an investigation of better materials for flat gages and to the adaptation of Stabilene Film, manufactured by Keuffel & Esser Co. This is a fully flexible material which lies as flat in use as rigid vinyl. Further, dimensional reliability is assured since Stabilene Film tolerates temperatures up to 220°F and moisture up to 98 per cent relative humidity with little measurable change. In this range its per inch stability is of the order of 0.000006 of an inch.

As the MC&TSA now uses the film, the gage is first laid out in the Instrument Engineering Office. All dimensions are exact and indicate permissible tolerances. The gage is drawn to full scale on a sheet of 0.003-inch transparent Stabilene coated one side for pencil and ink work. Exact reproductions are then printed by conventional photographic methods onto other sheets of 0.0075-inch Stabilene coated with standard Helios dry diazo emulsion.

Reproductions are made in sizes from four by eight inches to 26 by 68 inches. The smaller ones are made in standard rotary-type diazo

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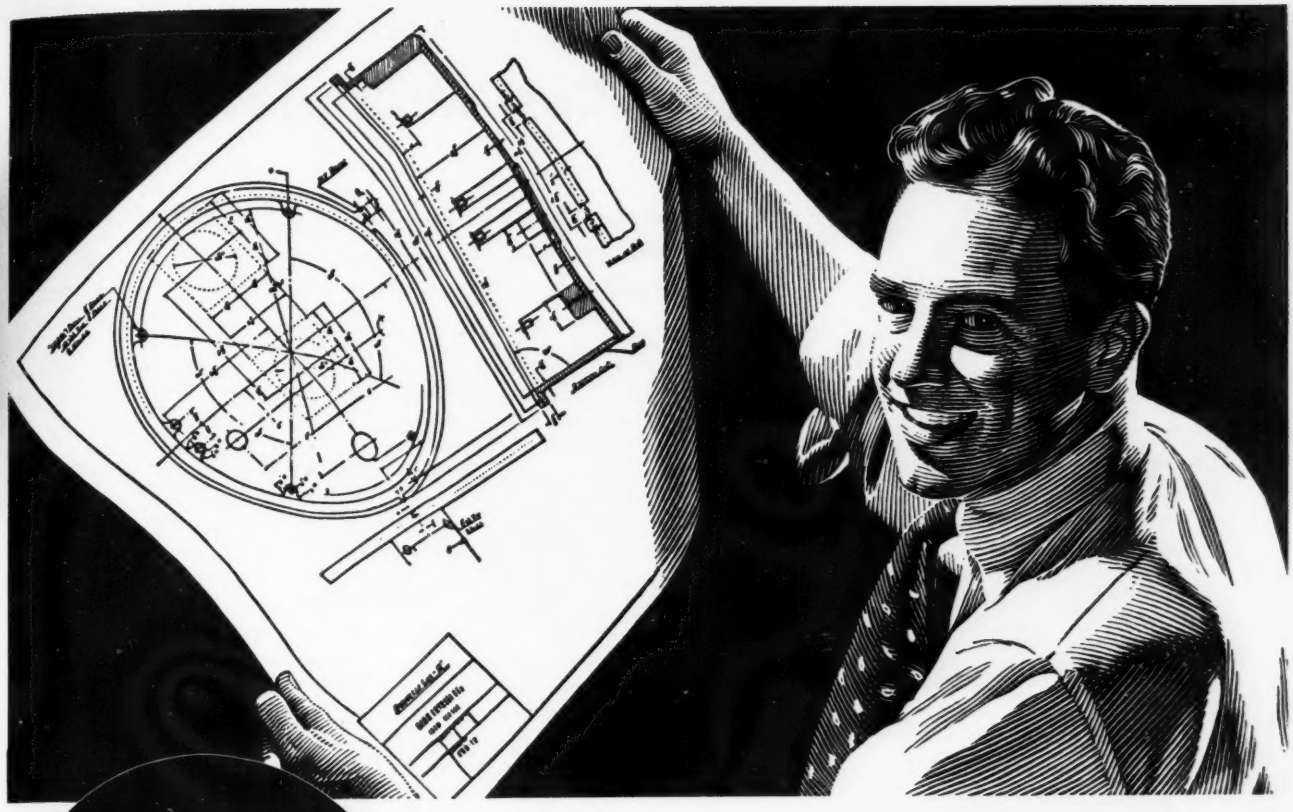

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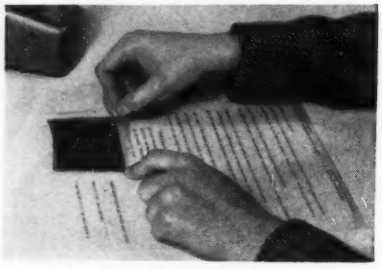
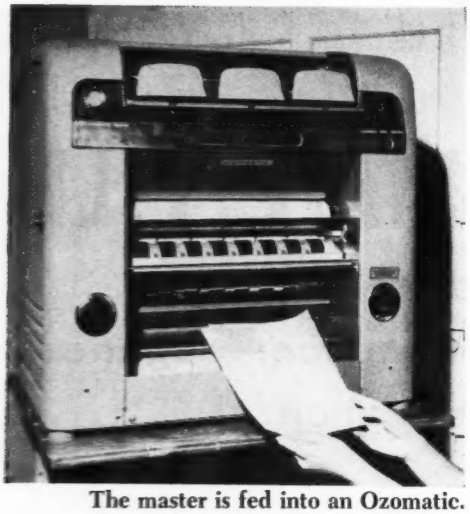
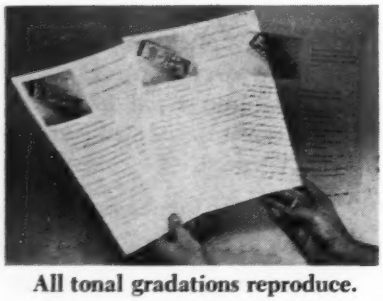
A b&w transparency is made.

It is taped to Typemaster films.





The master is fed into an Ozomatic.



All tonal gradations reproduce.

Multiple copies are low-cost.

As a result of development work by Ozalid and Polaroid, making multiple copies of combination typewritten and pictorial material can be done simply, utilizing the Polaroid transparency system and the diazotype direct-copy process. U.S. Steel is among the major companies employing the technique.

It has never been a problem to make multiple copies of typewritten material and line work alone. Nor has it been a problem to make opaque copies of transparencies. It *was* a problem, however, to get a high quality reproduction of both a continuous tone picture and written material; and this was a problem well worth working on. With high quality copies, you can make catalog sheets, brochures and other material for use in sales promotion, advertising and training.

To show how it's done, let's take the case of an engineer who wants to illustrate the several copies of his report page with a picture of an electronic device.

First, the information is typed onto Ozalid's Typemaster Film. An electric typewriter is recommended for best results, but an ordinary typewriter will produce satisfactory results. An acetate ribbon in the typewriter will yield sharp letters of high density, and with this special ribbon, the master sheet does not have to be backed with a sheet of carbon paper.

Next, a black-and-white transparency is made of the electronic device, using Polaroid's Copymaker, which will take any Polaroid Land camera. The subject is placed on a piece of fabric to give a pleasing background.

The Polaroid transparency is then taped on the *back* of the Typemaster Film in an open area containing no typewritten copy. For a "right reading" reproduction the transparency must go emulsion side down. The Minnesota Mining and Manufacturing Company's Tape No. 810 is ideal for taping the transparency down because it will not show up as a dark border on the diazotype reproduction.

To make the reproduction, the following procedure is observed: the master is placed face-up on top of the diazo sensitized paper, and fed into the machine.

There are a wide variety of sensitized papers that can be used for this process. U.S. Steel uses Ozalid Dryphoto, a continuous-tone material which produces a sepia image on white paper. It will reproduce most of the tonal gradations of the photographic film positive.

For within-the-company illustrated reports, a plastic-coated blueline or black-line sensitized paper gives a satisfactory continuous-tone as well as line copy reproduction. Cost per copy here is quite reasonable, too, running about a penny per sheet. And, of course, reproductions can be made in a single color on a clear film base. Ozalid calls these materials "Ozachrome" and "Viewfoil," and they are available in red, orange, green, blue, black, and cyan, magenta and yellow.

For long-run duplication of Polaroid transparencies, you can use these same techniques to make a master for an offset duplicator.

Line copy transparencies can be combined with descriptive copy written on Typemaster Film, exposed to an Ozalith Positive Paper Plate and processed in about one minute. The cost of an Ozalith Positive Paper Plate, 10" x 15", is about 22 cents. The extremely high contrast characteristics of the Paper Plate make it unsatisfactory for directly copying continuous-tone Polaroid transparencies unless a screening technique is used.

The major advantages of this system are that it is low cost and requires no skilled photographic or graphic arts techniques. Any company that has an Ozalid machine and a Polaroid Land camera can do this job. □

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by J. R. O'NEILL
Tecnifax Corporation

A technical breakthrough by diazotype researchers may mean millions of dollars in extra business for coaters.

Editor's Note: For several years the coaters of diazotype materials have been concerned about the limited use of diazo reproducibles due to their causing brownprints to fade when interfiled with them. Because of this propensity to bleach brownprints, prime contractors of the military establishment — which has millions of brownprints in its engineering drawings files — were prohibited from using diazo reproducibles. In answer to this problem, diazotype coaters individually launched intensive research programs to uncover the offending chemical and to find substitute chemicals or formulations which would result in brownprint-compatible diazo reproducibles. This article describes one company's researches — and its solution to the problem. At least three other firms also have broken the "know-how" barrier. They are: Charles Bruning Co., Mount Prospect, Ill.; Ozalid Division, General Aniline & Film Corp., Johnson City, N.Y.; and Keuffel & Esser Co., Hoboken, N.J.

A Problem And Its Solution

A recent problem concerning the application of diazo intermediates provides an interesting story in diazotype research.

Diazo intermediates are widely used as printing masters of engineering drawings and typewritten material. When needed, these intermediates are drawn from the file and are used to produce diazoprint copies.

Brownprints, which are intermediates produced by the mixed silver and iron salts process, are used in a similar manner. A problem arises when brownprints are interfiled with diazo intermediates. This interfiling causes the brownprint image to lighten in color, to a degree that the print appears faded.

The exact mechanism of this color shift in the brownprint is not completely understood. It is believed that the silver image of the brownprint, which is colloidally dispersed on the surface of the cellulose fibers, is partially reduced by a chemical component present in the diazo intermediate. Research by many companies engaged in manufacturing diazo intermediates proved the offending components to be thiourea, the primary stabilizer used to inhibit background discoloration in the white or background areas of the diazoprint.

Although the light-colored brownprints usually continued to fulfill their function as intermediates, or masters, there were objections to the color change on the part of some users. It, therefore, became necessary for the diazotype industry to find a means of either deleting the thiourea or finding a suitable substitute.

Because deletion of thiourea would leave the intermediate without background stabilizer, it became necessary to find a substitute which would fulfill its function without ill effect. The attack on the problem began with the consideration of how thiourea performs its function. Thiourea acts as a selective reducing agent which inhibits the oxidation of the diazo decomposition products, namely the aromatic amines. A literature search revealed that thiourea derivatives and certain organic dithio and trithio compounds can inhibit the oxidation of aromatic amines, in addition to thiourea. A study of these possible thiourea substitutes was made on the basis of solubility in the sensitizer solution and compatability with the sensitizer components.

The next stage of the project was followed by purchase or synthesis of the most promising compounds. This resulted in a collection of about 25 compounds.

The screening or testing operation next followed, in which these compounds were substituted for thiourea in the sensitizing formula. In each case, the experimental formula was subjected to many tests to see if the thiourea substitute had any deleterious effect on the shelf life or the print quality. In addition, of course, brownprint compatibility tests were run.

This screening operation narrowed the field from 25 compounds to two. These were B-dithiocarbanyl proprionic acid and guanyl thiourea phosphate. Exhaustive tests

continued on page 69

Left: 399EZ – Filmovara "Zoom" lens, "Cold Glass" heat filter, single frame advance, many other exclusive features. Most versatile of all projectors. *Center:* 399 – Reverses for review, shows still pictures, offers brilliant picture and sound. The world's most widely used sound projector. *Right:* 398 – The finest performance at the lowest cost quality allows. Magnificent new *pan-harmonic* high fidelity sound.

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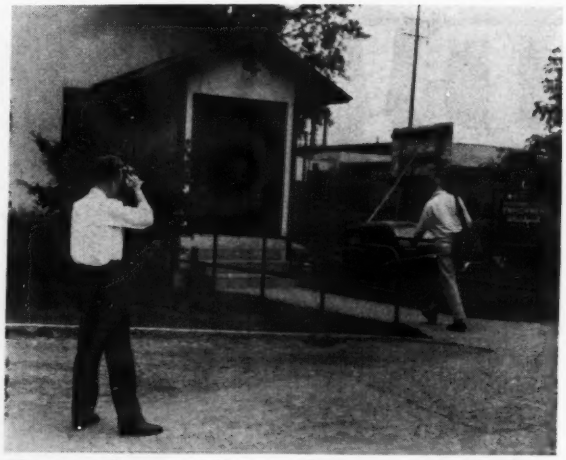
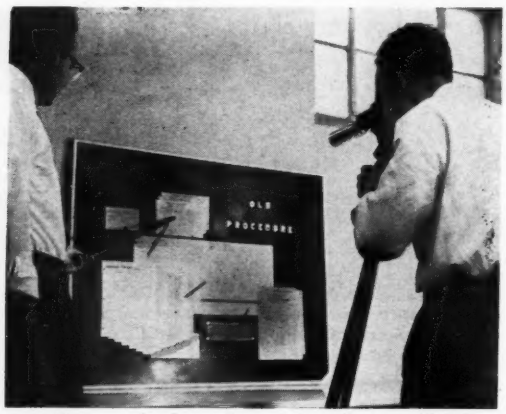
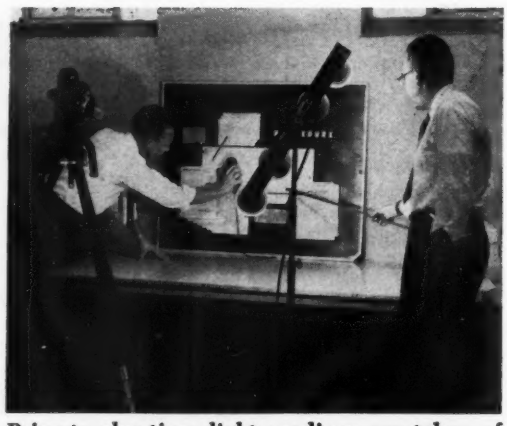


Photographer Rouselle turns his camera upside down to photograph a mail boy retracing his footsteps.



A 106mm telephoto lens is used at a distance of four feet from the subject for peak clarity.



Prior to shooting, light readings are taken of individual items on bulletin board. This insures an acceptable exposure during pan shots.

Put it on Film! One Answer to Work Simplification

16mm film, shot-in-the-factory, shows how team approach techniques can be applied to regular office procedure.

Work simplification projects are an integral part of modern industry. Industrial engineers are continually working on means and methods of improving the tools and techniques of office and factory work.

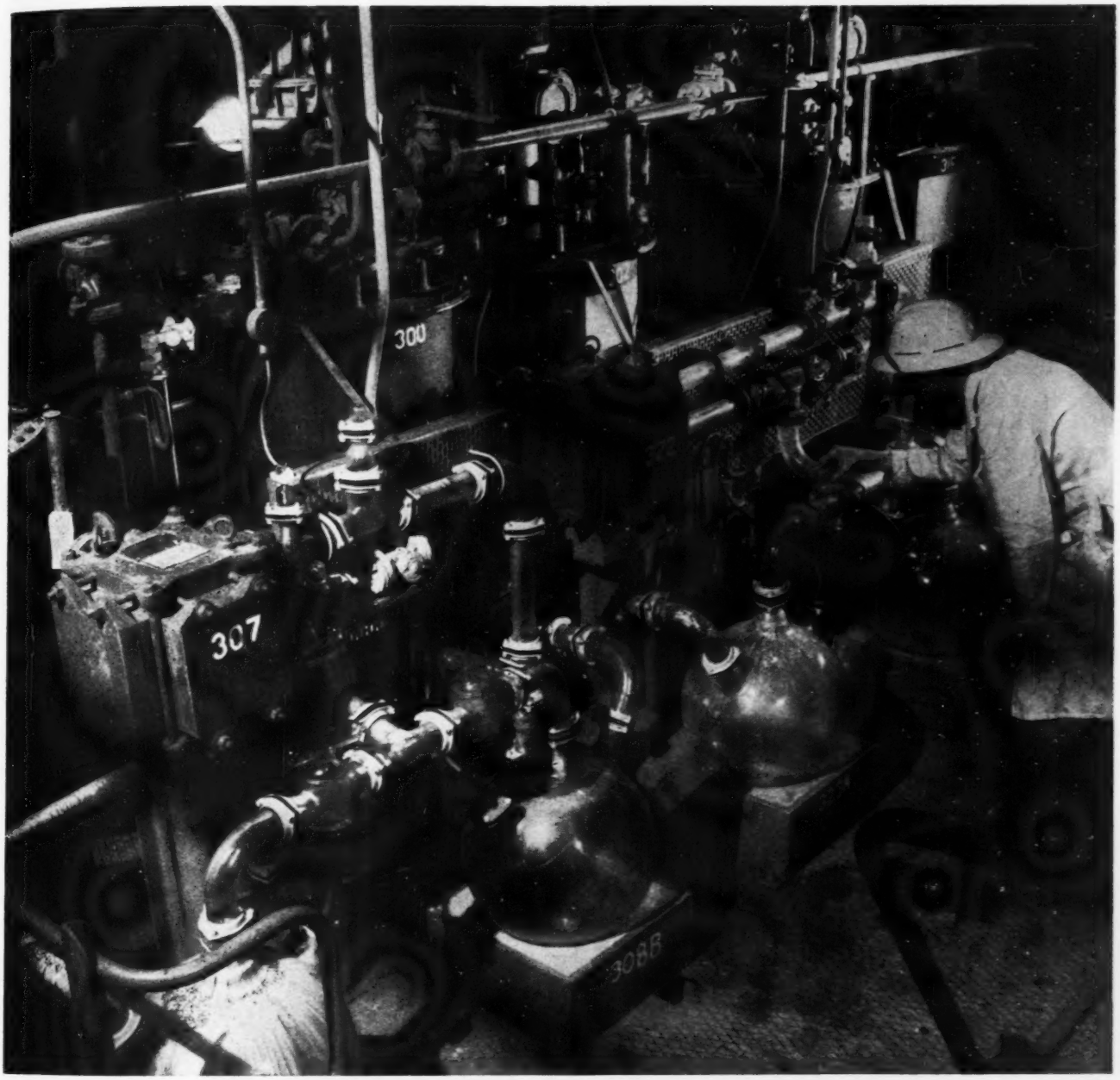
Engineers at Whirlpool-Seeger Corporation's St. Joseph, Mich., division are no exception. But to help exploit the results of their work — and to simplify getting across work simplification methods to employees — they have added a new wrinkle to standard procedures. By putting a typical project on film they show their program in actual operation and stimulate interest in it.

"Procedures for Ordering Books or Magazines," a 16mm, color film shows how team approach and work simplification techniques can be applied to office procedure. It was shot easily and inexpensively in the plant by Edward Rouselle, Jr., a member of the industrial engineering department. Rouselle's equipment consisted of a Bell & Howell TM 70 camera, two simple light bars of 400-500 watt lamps each, and Type A Indoor Kodachrome with an adaption filter for outdoor scenes. The three lenses used were a 25mm $f/1.9$ Kodak Cine Ektar, a wide angle 15mm $f/1.5$ Elgeet and a 106mm $f/2.7$ Elgeet telephoto.

Whirlpool's film follows, step-by-step, the five step work simplification pattern worked out by Whirlpool engineers. The first step is to select a job to improve and then pick the team to do it. Getting the facts and charting the old method is step two. Next comes challenging every detail by using the questioning technique followed by brainstorming to come up with all possible improvements. These improvements are evaluated and compared. In step four the new methods are charted for comparison with the old way by application of principles of motion economy. The fifth and final step is to install improvements.

continued on page 67

for sharp detail . . **. ILFORD HP3** film



Photograph by Bertram Follett, London, by courtesy of Albright & Wilson Ltd.

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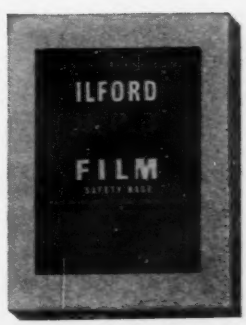

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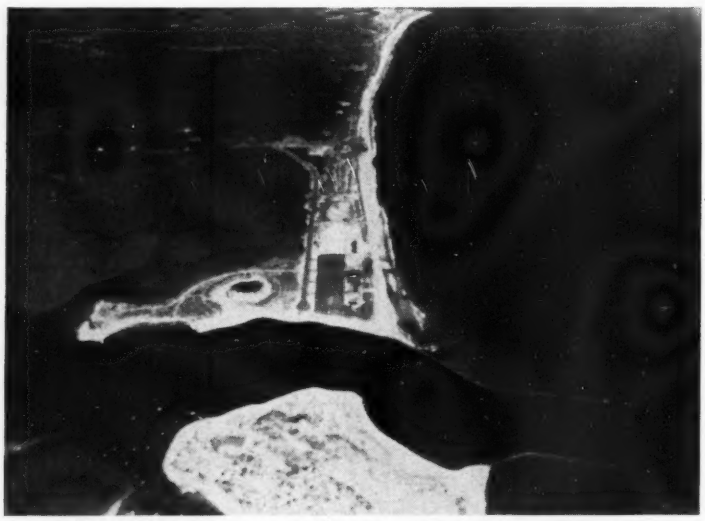
Coastline Photography

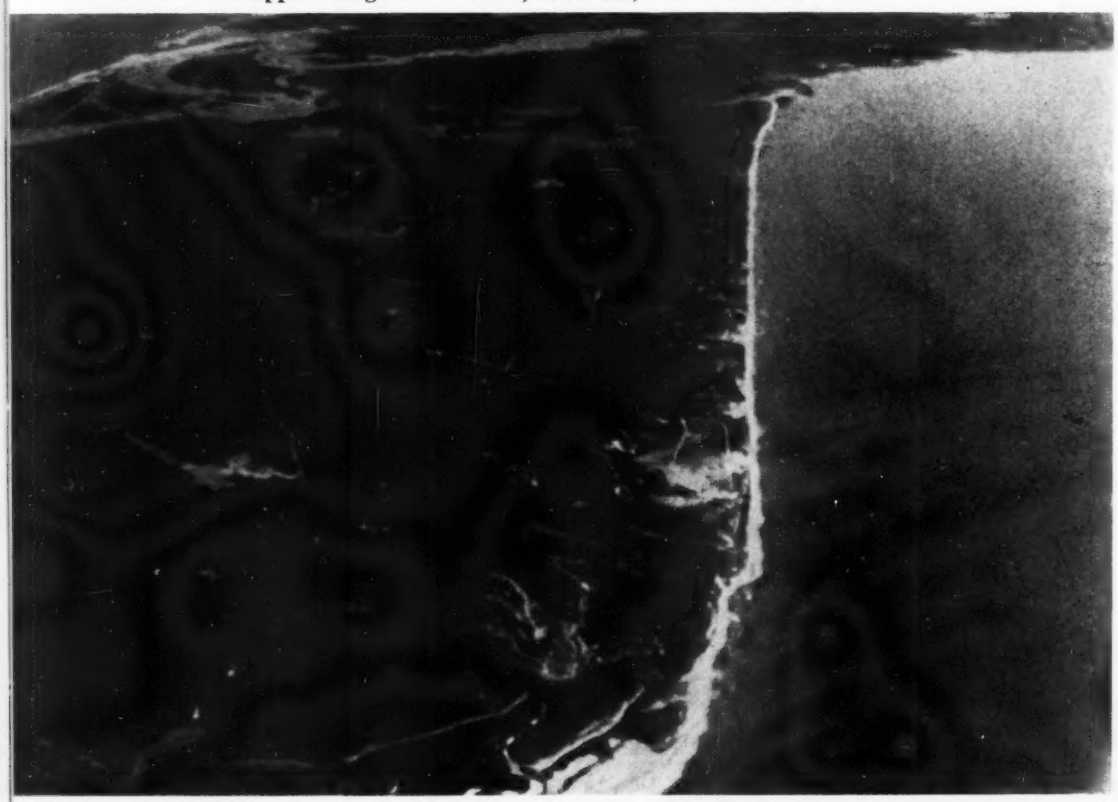
by J. M. ZIEGLER
and F. C. RONNE
Woods Hole Oceanographic Inst.

Time-lapse photography is an aid in the study of shoreline movements. Shows changes beaches undergo from day to day and season to season.



Low water at Nauset Inlet, Cape Cod, Massachusetts.

Ripples diagonal to shore, Eastham, Massachusestts.



What changes do beaches undergo from day to day and from season to season? Do offshore bars come and go, and if so, why? Do inlets migrate back and forth for no reason at all, or do they behave systematically?

These are some of the questions which are being studied by a group at the Woods Hole Oceanographic Institution on Cape Cod in Massachusetts. The group has found that beaches change somewhat with every tide and that every aspect of beach research must be studied in terms of changes.

As a tool to aid them in describing changes which take place along the shoreline, the beach-studies group has utilized modified time-lapse aerial photographs in color of the entire coastline of the United States from Eastport, Maine, to Brownsville,Texas.

The camera used is a 16mm Bell & Howell Model 200. The time-lapse triggering mechanism consists of a simple cam and lever device designed by Dr. William S. von Arx of the Institution. It is operated by a 12-volt Magnetorc mo-

Near-shore bars, Massachusetts.

tor. Power is supplied by standard dry-cell batteries.

The camera mount was designed so that the camera can be used from a tail hatch of a PBY. Thus, the camera looks backward. It is ordinarily tilted about 20 degrees downward, but the degree of tilt can be changed to suit the needs of the operator or to accommodate the kind of lens used.

The camera and motor, as a unit, are fastened to a movable plate which can be rotated on a vertical axis through about 75 degrees of arc, making it possible to follow an indented coastline with the camera or compensate for minor errors in the flight course. The axis of rotation is directly under the optical center of the lens.

The camera speed for all aerial photography done by the group thus far has been two frames per second. At this rate, a 50-foot magazine (2,000 frames) is used up in 1,000 seconds, or about 17 minutes, a period of time during which the PBY flies about 30 nautical miles along the coast at its speed of 110 knots.

The time taken to view the movie depends on the speed at which the film is projected. At a normal speed of 16 frames per second, the reel, or 30 miles of coast, is seen in 125 seconds, or as if one were flying at a speed of about 850 knots. At a projection speed of 10 frames per second, the apparent flying speed is about 540 knots.

Of course, the flying speed appears to increase if the plane flies below the desired altitude, many objects moving by much faster than objects farther away. If the plane flies below an altitude of 1,800 feet, as it is often forced to do by clouds and other conditions that reduce visibility, this movement becomes objectionable.

The altitude normally flown is dependent upon the weather and the characteristics of the coastline. A broken coast, such as that of Maine, is generally photographed from an altitude of 5,000 feet. A straight coast, such as that of Long Island is photographed from 2,500 or 3,000 feet.

A wide-angle lens (58 degrees) having a focal length of 9.5mm has been used for most of the coastal photography. This lens has an advantage over the normal 16mm camera lens of 25mm (24 degrees) in that the same ground area can be covered from an altitude only three-eighths of that required by the 25mm lens. Another advantage is that ground haze (present to a degree even under the best of circumstances) seldom becomes a serious obstacle.

Although the reasons for changes that occur along the coasts are not always revealed by aerial photographs alone, the photographs do tell us what changes are taking place. Here are a few examples:

Inlets change more often and more spectacularly than any other large feature of coasts. Photographs indicate that within a period of two months, a bar off Nauset Inlet, Cape Cod, coalesced with the tip of the spit. Changes in the Shape of Fire Island Inlet on the South Shore of Long Island were recorded during a period of about six months. Capes and promontories change in many complex ways, too.

Modified time-lapse aerial photography also provides a means of comparing similar features that occur at different geographic locations. For example, comparisons can be made of near-shore bars, giant ripple patterns, cuspate shores and beach ridges.

The photography is expected to serve several professions. Engineers who design structures in and near inlets or other coastal features can benefit by referring to movies of the coast taken periodically. Economic geographers will be able to observe changes in the pattern of land utilization and thus gain an insight into future problems. The many reclamation projects seen in photographs of Florida are of particular interest to geologists. □

Development near Naples Fla.

Technical Trends

by GEORGE ASHTON

ELECTRONIC ENLARGING

The revolutionary system of making photographic prints pioneered by LogEtronics Inc., is beginning to influence the design of printing equipment in other countries, too. The LogEtronics contact printer, which uses a cathode-ray tube as a light source, has the advantage over conventional photographic printers in that it provides a controlled degree of unsharp masking and, thus, can be used to produce good prints from difficult negatives. Specifically, it is most useful in reducing the contrast between large areas of tone while leaving the contrast in fine detail unimpaired.

The facility with which aerial camera negatives showing cloud shadows can be printed using this automatic dodging printer has to be seen to be believed and any practicing industrial photographer could doubtless pull plenty of negatives from his files which could be made to give superior prints with far less heartbreaking dodging by using a LogEtronics printer.

A few months ago LogEtronics announced the arrival of an enlarger based on similar principles to the contact printer and now, in the British magazine *Process* for August 1958, an enlarger manufactured in England under license from LogEtronics is described.

Known as the EP 10, the enlarger is a modification of a commercially available professional model for negatives up to 5 x 7 made by Kamm. The cathode-ray tube is fitted in place of the lamp and a special masking board with a transparent top contains the photomultiplier cell which controls the exposure.

The remainder of the electronic gear is contained within a low cabinet, with the controls at a convenient height for the seated operator. The electronic light integrator produces correctly exposed prints from a wide range of negative densities and the operator sets the controls for paper speed, processing and desired print density.

The price in Britain is in the region of £1500, equivalent to $4,200, say the manufacturers, EMI Electronics Ltd. This is high by comparison with the current price of orthodox enlarging equipment, but there is no doubt that the unit will produce prints of consistent quality from even the most difficult negatives; for any lab regularly handling quantities of such negatives it could well prove a good investment.

IMPROVED CAMERA PICTURE

An interesting change in the trend of camera imports in the United States is shown in figures compiled by the Bureau of the Census and released at the end of July by the U.S. Department of Commerce, Business and Defense Services Administration.

continued on page 44

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40MM FOCAL PLANE

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Specify Engineering Report No. 327

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TRENDS

continued from page 42

The average value of still camera imports from Western Germany at the manufacturer's level during the first quarter of 1958 rose to $50.53 per camera from a figure of $42.46 for the corresponding period in 1957. Still camera imports from Japan, however, showed a considerable increase in average value at the manufacturer's level, rising from $3.85 per camera in 1957 to $11.74 in 1958.

In contrast to the increase in value of the individual cameras imported both from Western Germany and Japan, on average the actual numbers of cameras imported from both sources showed a decline. The survey shows that U.S. still camera imports from all sources dropped by 60% in 1958, from 295,725 cameras in the first quarter of 1957 to 118,947 in the first quarter of 1958. Imports from Western Germany declined only by 28.8% from 50,409 to 35,879.

The decline in actual numbers of cameras imported from Japan was more drastic, from 241,779 in the first quarter of 1957 to 77,317 in the first quarter of 1958, a drop of 68%.

The new cameras of advanced design which were shown at Photokina, the trade fair at Cologne, Germany, which has just closed, will probably result in an increase in imports from Western Germany in the last two months of this year. In the case of imports from Japan, the continued efforts of the photographic industry associations will probably also have the effect of increasing the unit value of cameras imported from that country.

FILM BASE MANUFACTURE

In spite of the fact that celluloid materials have been used as a base material on which to coat photographic emulsions for about 70 years, little has, to date, appeared in print describing the manufacture of such film base. The rigorous requirements of the photographic industry have led to individual manufacturers closely guarding their methods of manufacture.

However, in the *British Journal of Photography* for July 18, 1958, a rather full description is given of the manufacture of photographic film base in England at the $7,000,000 plant erected a few years ago by Bexford Limited, a company jointly formed by Ilford Limited and BX Plastics Ltd.

The first stage in the manufacture of film base is the preparation of the dope. This is a mixture of cellulose triacetate flake, the solvent and a plasticizer. The flake is a coarse white powder made by the interaction of cellulose in the form of cotton linters with acetic anhydride and acetic acid; the plasticizer is a non-volatile softening material, such as triphenyl phosphate, serving, among other things, to make the whole more flexible.

The dope is loaded into a mixer and then pumped through a heater to drive off the dissolved air. This is followed by pressure filtering to remove extraneous dirt and haze.

From the filter the dope passes to a storage tank, where it is pumped to a spreader to begin its journey through the casting machine from which it emerges in wide 1,000-ft. (minimum) rolls of flawless film base.

continued on page 47

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continued from page 44

The casting machines are totally enclosed, need only two operators in spite of their 80-yard length and operate 24 hours a day throughout the year except for two public holidays and a two-week break in summer.

The casting bands, the only metal parts of the machine not made from stainless steel, come from Austria and are marvels of precision engineering in themselves. Despite their great length (it must be at least 80 yards), their thickness is no more than 34-thousandths of an inch and the surface obviously has to be perfect. A special operating surface is cast on to the copper alloy band before it is put into service. The bands cost in the region of $28,000 each.

A good deal more fascinating detail relating to this little known process is given in the original article, which adds up to a valuable insight into the material on which our films are coated and which we take so much for granted in our everyday use of photographic products.

NEW IDENTIFICATION CAMERA

The Hollywood magazine *International Photographer* for August 1958 reports that business losses in the United States from bad checks stack up a record $640,000,000 annually. A useful device to combat these losses is described in the article by Hilda Black in which the report appears; this device takes the form of an identity recorder, which is used in a store when a customer pays by check. Manufactured by the Identity Recorder Company, the device consists of a box which measures only 13 x 18½ x 7½ inches, which can stand on the store counter. By the simple operation of pressing a small button, a photograph of the check can be made almost instantly and at the same time the fingerprints of the person passing the check are also recorded.

The camera unit uses 100-foot spools of orthochromatic 35mm film with standard perforations in a specially built magazine. The camera exposes 15 frames to each foot of film and the entire operation of photographing the check and the fingertips of the customer takes only 30 seconds. □

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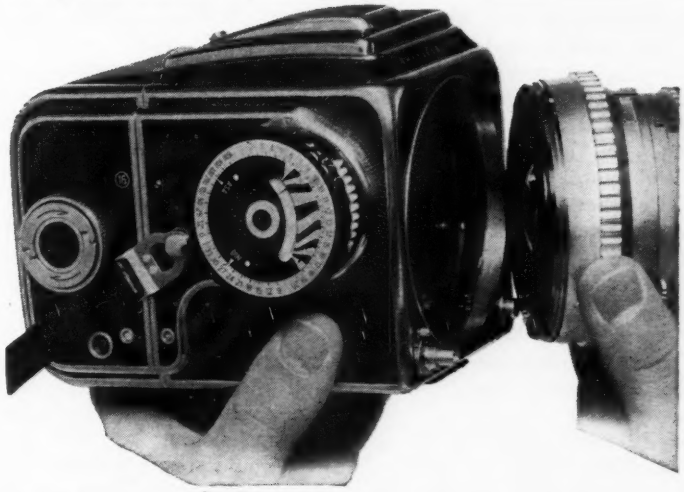
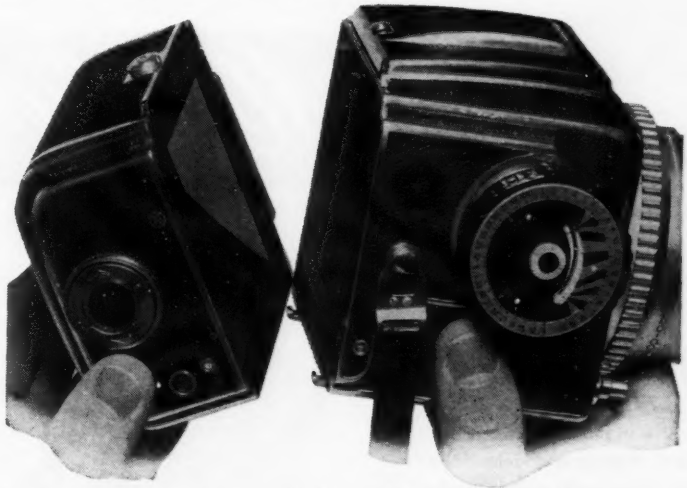


new model – the **500 C** – now includes Synchro-Compur shutter and automatic diaphragm in every lens, with coupled EVS system. Diaphragms close automatically to preset openings when you shoot. Precision Zeiss Lenses include Standard Planar 80mm F:2.8, Distagon Wide Angle 60mm F:5.6, Sonnar Long Focal Length 150mm F:4.0, and Sonnar Telephoto 250mm F:5.6.



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Graphic Viewpoints

by EARL STANTON

Whiteprint Gains Importance

The reproduction field for many years was satisfied, and justly so, with drawings printed on blueprint paper from transparent or translucent pencil and occasional inked drawings. In the past few years more and more whiteprint paper material has been employed for use in reproductions that formerly were the standard blueprint.

Over the past several months this writer has been asked the reason for blueprint and whiteprint, why is one used in some areas while in another firm both mediums are used and so on.

Actually there seems to be no great problem. One can make a legible reproduction via the old blueprint paper or off the same original drawing can run a brilliant black and white reproduction. Technically a blueprint is a negative in photographic terms whereas a whiteprint is a direct positive made from a positive. You will find many firms using a blueprint paper achieving a fine legible blue line reproduction on white background. This is possible if a negative is used as the printing medium. This blue line process probably shows up more today where industry uses a reduced drawing and the reduction negative from the original drawing serves as the printing medium.

I would speculate that if a new plant were being built and equipped today, whiteprint equipment would more than likely be installed. Editorially speaking, I would say this thinking was the right thinking.

Some of my reasons for making this statement stem from several thoughts. First, whiteprint machines will run paper at 26 to 30 feet a minute and equipment exists which will grind whiteprints out at the rate of 80 feet per minute. Such speed is of course needed in some areas but for the most part one or more machines running at 26 feet per minute can fill the orders of the average repro department. Blueprinting speed averages out at 12 to 15 feet per minute.

High Energy Light

Second, and perhaps more important, a blueprint paper is printed with a high energy light source, the paper passes through the conventional blueprint solutions to attain development and separation of white from blue to make the drawing.

The development is a wet process. At this point the question arises of just how stable does the customer want the reproduction. From all indications dimensional

continued on page 54

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What you should know about Cronaflex

TRADEMARK

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CRONAFLEX is a new line of photographic reproduction films on Du Pont Cronar® polyester photographic film base. CRONAFLEX films are available in these types:

1. **DIRECT POSITIVE FILM** for making sharp black-line positives directly from pencil or ink drawings.
2. **CONTACT FILM** for negative "same-size" reproduction of originals for use in producing accurate positive "second originals" and intermediates.
3. **PROJECTION FILM** for use in cameras or enlargers to produce negative or positive copies.

WHY Cronaflex ?

Because of their unique properties, CRONAFLEX Engineering Reproduction Films offer decisive advantages:

- **CRONAFLEX,** thanks to its "Cronar" base, is rugged, resists moisture, and is the most dimensionally stable, tear-resistant engineering film you can use.
- **CRONAFLEX** resists kinking, and lies flat. Its high-contrast emulsion improves original drawing legibility. Superior translucence permits faster machine speeds, giving more reproductions in less time.
- **CRONAFLEX** has a matte surface that provides the finest pencil and ink acceptance yet devised. Lines do not smudge, can be drawn—or erased and redrawn—on either side of the film.
- **CRONAFLEX** dries rapidly. Intermediates can be ready for reproduction in fifteen minutes or less.

WHO IS USING Cronaflex ?

Engineers, designers and draftsmen in automotive, aircraft, public utilities and defense industries. Also, blueprinters, cartographers, architects, surveyors—in short, everyone who *makes* or *needs* top-quality reproductions. CRONAFLEX films on .004″ "Cronar" base will make long-lasting intermediates and duplicate originals. Where dimensional stability is critical, CRONAFLEX Engineering Reproduction Films are available on .007″ base.

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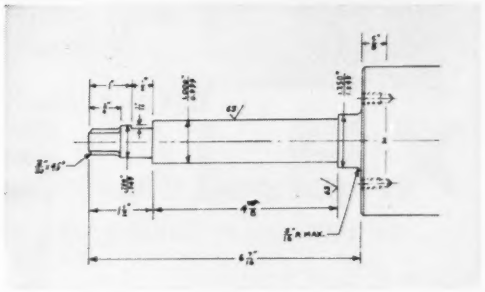

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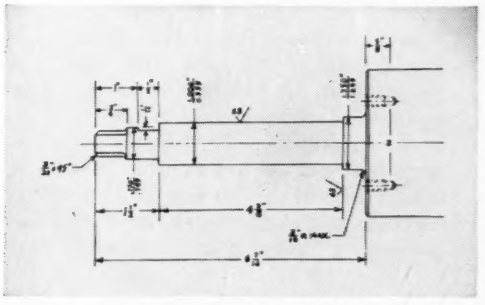

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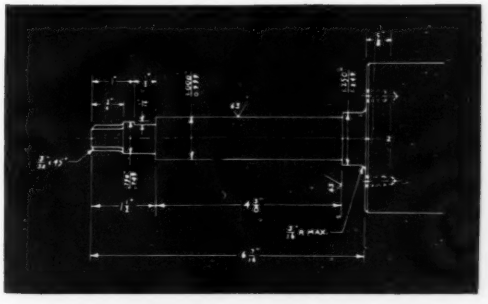

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Industrial Workshop

by DAVID B. EISENDRATH, JR., Technical Editor

Diazo and Other Reproduction Processes

At the National Industrial Photographic Conference recently held in Chicago, one of the papers which received a great deal of favorable comment was called "Industrial Reproduction Processes." Presented by people from Cooper-Trent, Inc., a large Washington, D.C. concern specializing in diazo, blueprinting, microfilming and the making of reproductions of all sorts, the talk served as an introduction to various systems of reproduction processes used in industry. Particularly interesting was the relationship and comparison of various reproduction methods and a clue to relative cost, processing complication and use. Just seeing graphically where one should use diazo, where photography, where brownprint or Vandyke, was worth the price of admission.

The data for the talk on reproduction processes was provided by the Keuffel and Esser Company, which had previously compiled much of it to help their own sales staff, and copies of the entire paper were made available to those attending the Industrial Conference. I was curious to know why K & E went to the trouble and expense involved in a presentation for industrial photographers when their special interest, I believed, was in the drafting department. K & E, however, makes a large line of reproduction materials, photosensitive papers, liquid emulsions, etc. They, like the Tecnifax people we've mentioned in these columns before, had become aware of the fact that in many industrial plants, it was the photographer who was experimenting with new techniques, materials and methods, and introducing them to the reproduction department.

I was, therefore, delighted to find that the presentation made in Chicago was liked and caused a good deal of comment and mail. I was somewhat annoyed, however, that some photographers skipped all programs on reproduction methods because, according to them, "that's not in our department."

I have long believed that the industrial photographic department that is a going and growing concern must not conduct itself as a luxury department, nor yet as a necessary evil. The industrial photographic departments that continue to grow both in respect and budget-wise are those which are constantly contributing new methods, systems, techniques, better and cheaper ways of producing both the paperwork necessary to

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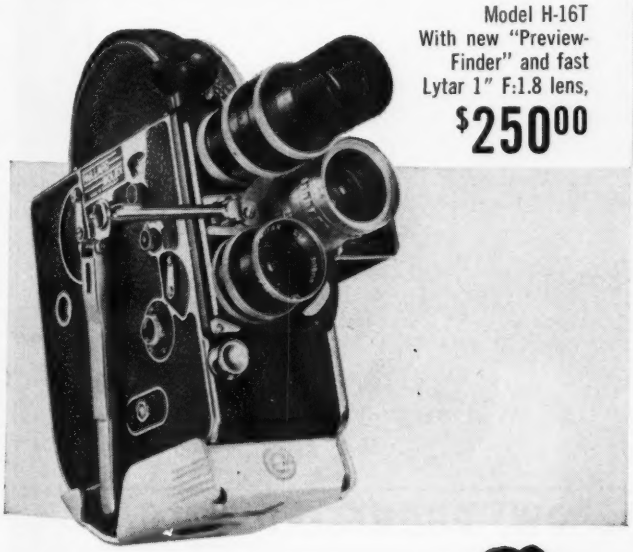

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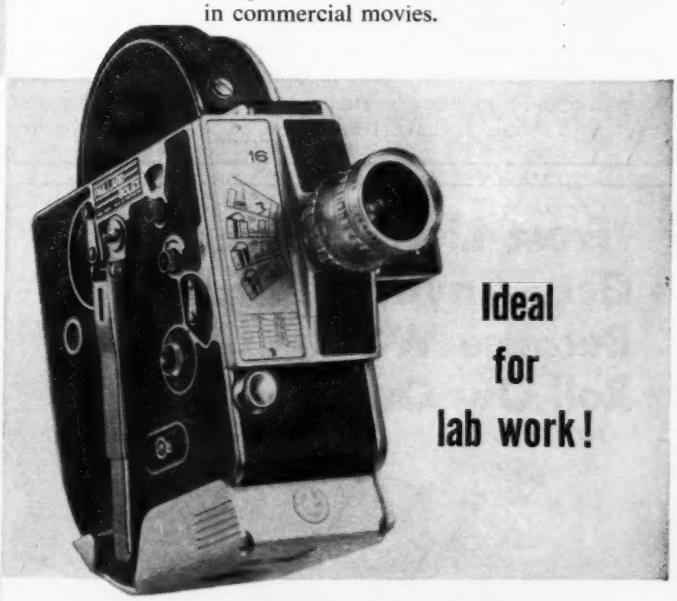

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conduct a business (plans, blue prints, etc.) and are also striving constantly to find better techniques to help sales, production, research, quality control, etc. Except for the highly specialized industrial department doing such things as only public relations or service processing, there is no phase of industrial photography in which a thorough knowledge of and familiarity with the principles of diazo and the materials that are offered with various diazotype emulsions cannot provide time—and money-saving techniques.

Just to jolt you a bit, let's take the motion picture production people in an industrial photographic set-up. Why should they be the slightest bit interested in diazo materials? "What has the making of engineering drawings got to do with us?" they ask.

Actually, there are many diazo materials that are of great help in motion picture and audio-visual work. Start off with the storyboard. Where production is complex and/or on many locations, and it is desirable to have several sets of storyboard cards available, there is no need to take the time to copy them, or go to the expense of duplicating them photographically, when, if the originals are done on translucent material, 50-pound card stock dupes (such as K & E's 480-CS, Tecnifax's 15XX or Ozalid 105C) can be produced without a darkroom, washing or camera, and cost *less* than a penny apiece.

FREE OFFER

A handy "Reference Chart of the Major Reproduction Materials" can be obtained free-of-charge by writing to David B. Eisendrath, Jr., in care of this magazine.

The biggest use of diazo materials in movies, however, is in titling and animation work. If you are now doing your own titles, and particularly the simple lettered title in color or black-and-white for the inexpensive training or in-plant demonstration; if you are making films for internal use on a limited budget; in short, if you are in the business of making the "quick, cheap, and dirty," as Al Peed of Kodak calls them, you don't know what you're missing if you haven't investigated the tricks of titling with diazo materials. O.K., so you've got a hot press available, and you've got a whole case full of ceramic letters. But you can use Fototype or Add-A-Type or Cello-Tak (all of which are various alphabets in many different faces and in a variety of sizes). These letters are removed from the basic font and mounted quickly and easily on a Mylar template, which may be pre-punched for registration on animation stand or titler. These templates can be quickly and inexpensively reproduced in diazo foils (transparent film material) in a variety of colors, with colored letters on clear film (which can be overlayed on color backgrounds or double-exposed in an animation set-up), with black letters on colored foil (such as Tecnifax's Diazochrome-Black with tinted base) or, using such material as Varicolor foils, as many as five colors can appear on one sheet.

continued on page 60

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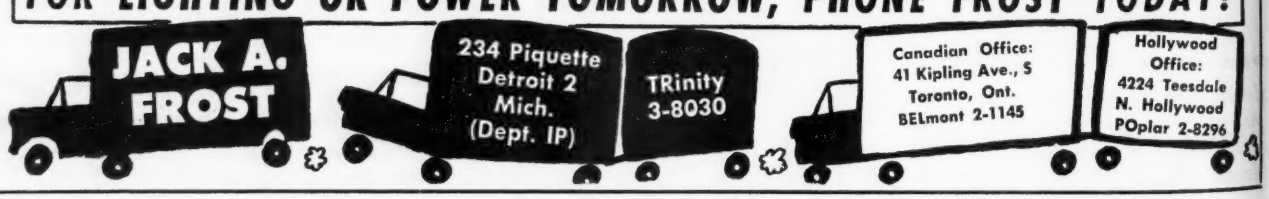
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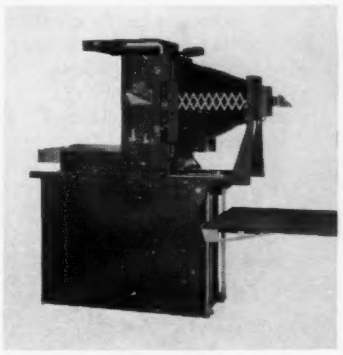

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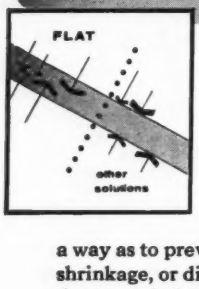

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continued from page 48

stability in drawing reproduction is being favored by many companies. Needless to say when you soak a paper with solutions, pass it through several chemicals to bring out the blue and white line separations and then heat and dry this paper, it will change size.

In white prints the printing paper is a member of the diazo family. The paper is printed or exposed by much the same high energy light source from the original drawing or better still from an autopositive master, the sensitized paper passes through a developing vapor (probably ammonia) which brings out the line drawing or image. The paper in whiteprinting is therefore not water or chemical soaked; in fact, it is generally speaking a dry development process compared to the conventional blueprint. Therefore, the whiteprint will hold to relatively same dimensions as the original.

If one were real methodical in the complete operation, that is, from start of original drawing on a stable base material, like Cronar and the reproduction printed on a stable base material, it would be possible to hold exact size within tight specifications of perhaps .004 or .005 of an inch. This would of course be under optimum conditions with controlled humidity, temperature and so on.

This writer discussed the blueprint vs. whiteprint topic with an old hand in the business — an operator whose department runs both whiteprints and blueprints in the course of a day. Among the points brought forward was one very interesting facet. In making whiteprints the paper can be purchased in sheets in the exact size needed. This therefore cuts down the cost of the raw stock. It also saves trimming which is always a time problem. When a 20 x 24 whiteprint is made the drawing is placed over the same size whiteprint paper and run through the machine. The repro comes out ready for the customer. In blueprinting the raw stock is carried in rolls, and I am sure that anyone engaged in the reproduction business will agree that the paper wasted probably equals the paper printed. Unless the drawing and drafting departments hold to a standard size original (and very few do) drawings of all shapes and sizes come from the drafting tables. This is not the easiest problem to control. The size of the original depends on what orders have been given the draftsman, what the engineer or designer is looking for as far as scale is concerned, and other factors.

The ideal solution to such a problem would be to reduce all drawings to a standard size and whiteprint back on reduced size sheets. I am sure a sizeable savings would be realized in a short period of time, not to mention the convenience in filing, handling, mailing and so on. Picture, if you will, a blueprint 12 feet long and three feet wide being mailed. This is done many many times during the average day in many plants. A drawing neatly and well printed on a sheet 18 x 24 inches would serve the same purpose and tell the subcontractor or vendor all that was necessary to know.

Many Changes

Much could be written about the ease in making changes on this same subject but one or two points made here will serve the purpose. In today's industry few if any drawings are made that are not changed either before they are finished or the day after the prints are made. Sometimes these changes are major, more often they are minor. A new hole is made in the part or a connection is moved. No matter what the change may be, some work must be done on the original or a second original, preferably on the latter to save the original. Once the original has been made, reduced and a master printed from it, changes can be more easily made on the smaller diazo material with eradicator and the new revised prints made from the second original.

More Profit

The reproduction field has changed and is changing with each new day, and every company involved in drafting, drawings and reproduction would be wise and would profit at the year end if they were to investigate the new modes and methods employed in drafting, reproduction and the whole field of graphic arts. Each manufacturer and supplier of drafting equipment and reproduction articles is armed with new suggestions and a company is unwise if it does not keep abreast of what can be done — faster, better and less costly through new mediums. □

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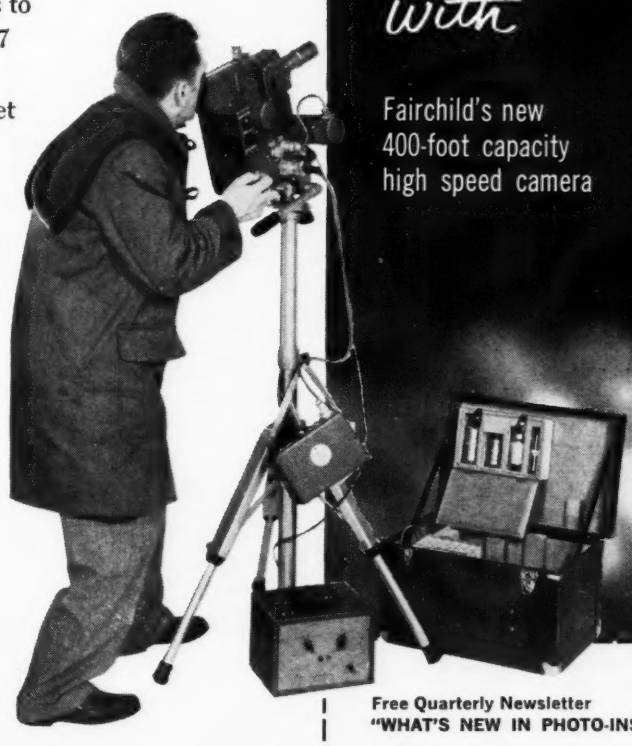

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Debulking Files at Westinghouse

The Air Brake Division of Westinghouse has secured important files against fire, flood and disaster, and recovered considerable floor space by placing its complete master file of strategic engineering drawings on 3x5 and 5x8 cards.

Originally, the master file had comprised some half a million brown line copies (full size) of the original drawings and subsequent revisions. The vital file had been accumulating since George Westinghouse started making brakes for railroad cars in 1869, and some of the prints were ragged from repeated use. The file was housed in 20 over-size file cases that sprawled over nearly 3000 square feet of valuable floor space in the Wilmerding, Pa., plant. Each file case had cost about $300, yet was not fireproof. The company recognized that as time went by, more file cases would be needed and the risk of destruction would be proportionately increased.

"We would not dispose of the old prints even though that might seem to be the sensible thing to do," reported H. R. Fuehrer, assistant to the chief design engineer of the Air Brake Division. "Even the oldest drawings had to be kept in case equipment still in service should need replacement parts or other service."

Mr. Fuehrer explained that Westinghouse had to find a photographic reduction technique that would accommodate large original drawings. A substantial reduction would be needed and yet the reducing process had to provide a high degree of image-resolution to permit blow-back to original size when necessary. He also pointed out that the easy indexing of the reduced file was essential if clerical costs were not to become prohibitive.

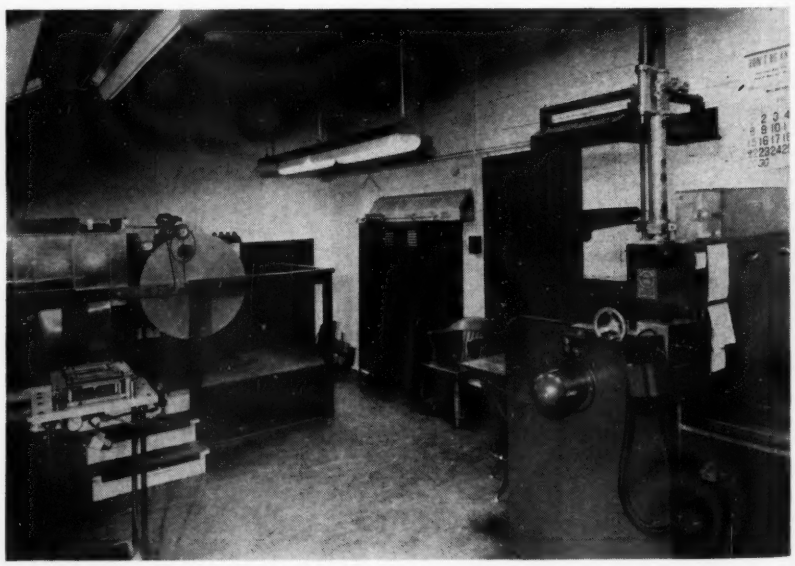
Westinghouse decided upon the Neoflow continuous reducing camera, currently made by Pam Manufacturing and Sales. The camera was developed by the C. B. Collins Supply Company in conjunction with Peerless Photo Products.

Reduced to Card Size

The Neoflow continuous reducing camera enabled Westinghouse to reduce its entire engineering drawing file to card size, permitting storage in conventional 3″ x 5″ and 5″ x 8″ card-size cabinets occupying only three per cent of the space formerly needed. The original drawings ranged in size from 8½″ x 11″ up to 26″ x 42″. These and intermediate sizes were brought down to card size by taking advantage of the full range of reduction ratios afforded by the Neoflow camera. Six reduction ratios are available: 6:1, 5:1, 4:1, 3:1, 2½:1 and 2:1.

The new reduced-size engineering drawing file cards are right-reading negative copies made on Peerless Neoflow single-weight, glossy projection paper. It was not necessary to re-index the new files since the parts number identifications are reproduced from those appearing on the originals. The

continued on page 63



Reproduction division at Westinghouse Air Brake in Wilmerding, Pa.

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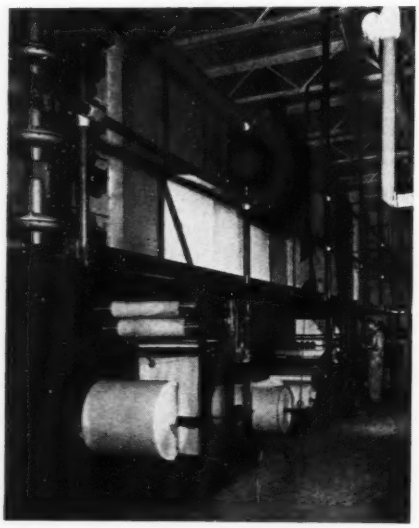

250 feet of the finest coated paper roll off this new Azon coating machine every minute. Modern equipment such as this enables Azon to meet today's expanding demands for quality reproduction papers.

Sensitized reproduction materials manufactured by specialists, sold through distributors.

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DIAZO SLIDES

continued from page 22

ed under dry objectives up to the 4mm achromat.

The procedure chart for marking high power fields of blood cells (p. 23) gives additional instructions for indicating very small areas to be photographed or examined under high dry or an oil immersion objective.

The other procedure chart on p. 23 of a blood smear provides a method for indicating areas on a slide prepared without cover glass, in which case the diazotype film is used sensitized side up. The sensitized surface is made visible even if immersed with oil by a coating of finely dispersed microscopic India Ink particles as described earlier . The oil on the sensitized surface must be removed with xylene before development in ammonia fumes.

Relocation of Slide Areas

The developed film attached to the slide is examined with a hand magnifier to determine the location, size and number of indicating marks, which appear as clear discs on the darkened film.

The slide is placed on the microscope and observed from alongside. If the condenser and lamp diaphragms are opened fully and filters removed, a flash of light will be seen as the clear area is moved into the illuminating beam. The clear spot is viewed and centered under a low power microscope objective. A higher power objective may be used before the film is removed, if its working distance permits.

The lamp diaphragm is closed down so that its image coincides with the clear spot on the film.

The microscope is next focused on the specimen and the substage condenser is racked downward to bring the lamp diaphragm image into focus on the specimen.

If only one area is marked the tape is removed and the slide cleaned in preparation for photomicrography.

If more than one area is marked on a film, mechanical stage readings and sketches will serve to relocate them after the film is removed.

Alternatively, after examination and notation of all indicated areas, one of the pieces of tape may be detached from the slide and the film raised and folded back. When folded down again, the indicating marks will fall close to their original positions.

A slide area may be re-marked by the diazotype method after a photomicrograph is made, for relocation of any microscope.

In our experience, the slide area locating procedure described has proved to be the method of choice when a supply of prepared diazotype film tabs is available at the microscope.

The value of having the boundary of a selected field indicated for photomicrography, and the simplicity of the marking procedure, outweigh the disadvantages of having to remove the film for critical examination.

The slide marking procedure using diazotype film was developed to save time in designating exact microscopic fields, and to provide the photographer with information needed for the determination of optimum magnification and utilization of the most suitable optics.

Condensed from the Journal of Biological Photographic Association.

INSPECTION GAGE

continued from page 32

printers. Larger sizes are commercially reproduced in big printing frames that hold the work flat.

Copies are printed for field use as required. Since gages of this type are simply low cost reproductions of the gage master, they are classified as expendable property. Thus, the extensive and expensive accounting paperwork associated with nonexpendable property is eliminated. In addition, no inventory is needed as in the case of silk-screened gages. Because the master gage remains at the inspection division of MC&TSA, additional working reproductions are made promptly in quantity as needed.

In the last year, some 20 different types of gages on Stabilene have been introduced. The cost of producing them has been approximately $15,000 less than the estimated expense of making a like number of silk-screened units.

Field experience with the flexible inspection aids has been so satisfactory that some contractors in whose factories the gages have been used asked the MC&TSA if they may obtain similar gages for their own use. □

continued from page 31

types", pressure-sensitive symbolic tapes and other materials which make it possible to prepare professional-looking slides without extensive original art. Some of these "do-it-yourself" materials are: "Chart-Pak" Tapes, manufactured by Chart Pak, Inc., Leeds, Mass.; "Fototype", manufactured by Fototype Corporation, Chicago, Ill.; and "Blu-Zip" Patterns, manufactured by Paratone Corporation, Chicago,

Easily Processed

The diazotype color films are quickly and efficiently processed in diazotype (whiteprint) machines of the type used in industry to produce prints from engineering drawings and in business for office duplication. Some of the leading names in this field are Ozalid, Bruning and Tecnifax (all mentioned earlier); Paragon-Revolute Corporation, Rochester, N. Y.; C. F. Pease Company, Chicago, Ill.; and Peck and Harvey Corporation, Chicago. In the absence of mechanical processing equipment, satisfactory slides can be produced by using sunlight for exposures and developing the exposed films in a large jar filled with ammonia fumes, or by using the services of a commercial blue printer.

A single-color slide is quickly and easily prepared by contact-printing a translucent original on any one of the diazotype color films. Through simple color-separation techniques, it is possible to produce dramatic, multi-color slides by preparing overlays in various colors. These techniques are described in the booklet, "Diazochrome Slides for Visual Communication" which is available free of charge from Tecnifax Corporation.

Help Available

Assistance in the conception, production and presentation of diazotype transparencies for overhead projection may be obtained from any of the manufacturers of diazotype films; for example, my own company conducts a continuous free training program.

We urge you to investigate the technique by requesting a demonstration from one of the diazotype color film manufacturers. It could be just what you need to solve a major communication problem. □

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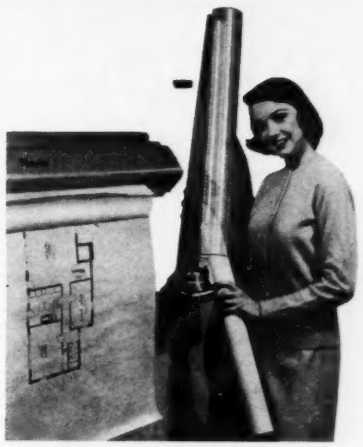

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"It has been a real pleasure to find as we have with the Rotolite that someone has made available an equipment as simple and as flexible in use as yours has proved to be . . . results are uniformly clean and legible . . . at a cost far less than that of any other reproducing machine" — Industrial Gauges Corporation, West Englewood, N. J.

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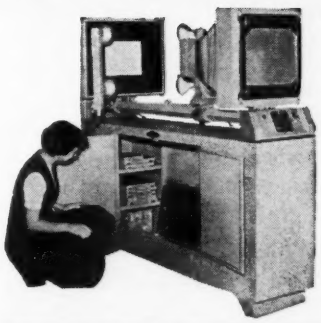

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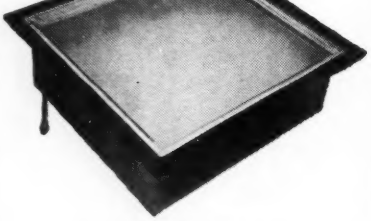

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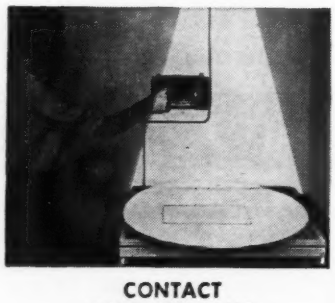

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INDUSTRIAL WORKSHOP

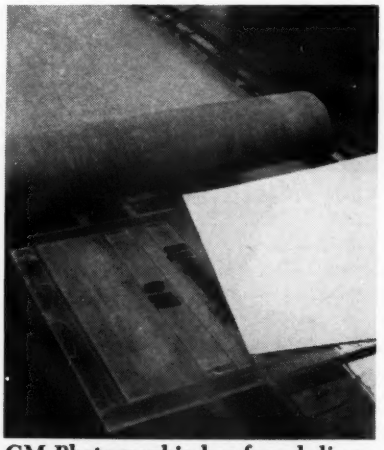
continued from page 52

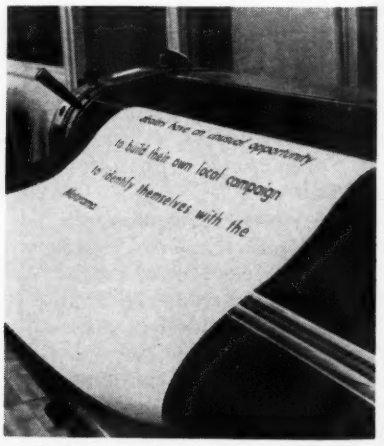
One of the good basic tricks with diazo materials involves the reproduction of alphabets for setting titles. The alphabets mentioned above can be used for this. Tecnifax sells several sets of master alphabets on a material called "Ultrafoil," which has, incidentally, one of the most opaque, dense black images available. When I have used it for making titles for film strips, I have found that it is even more opaque actinicly than any photographic graphic arts film. When you get one of the basic alphabets that you like, you use it as a master and knock off as many sets of alphabets as you want. Even reproducing them on another sheet of "Ultrafoil" only costs about 25 cents a sheet. Incidentally, at the National Audio-Visual Exhibition, I came across another kind of lettering for titles called "Planotype," which is made by the Planoscope Corporation. This is a letter made of a special type of plastic, which is thin, pliable and slightly sticky on the back. The letters come in sheets, arranged in frequency distribution alphabets, mounted on an aluminum sheet to which they stick because of the tacky coating with which they are backed. They look like embossed letters. They are picked off the storage sheet with a stylus and quickly arranged in words on wood, glass, paper or metal, where they can be used as quick signs and display letters. I find, however, that when they are transferred (easily with a strip of Scotch tape) to a Mylar or other clear plastic base and run through a diazo machine, they make a good and effective title. They are reusable, too.

One of the biggest ways in which diazo materials can serve as time and money savers for motion picture production is in the preparation of animation cells. When images must be repeated on cells, diazo foil dupes provide inexpensive cells. When animation is such that an action can be achieved by new placement of parts of the subjects, some industrial animators have discovered the system of using templates with the basic figure and moving components quickly assembled from diazo foils. When animation is required of colored subjects, diazo foils made of subject outlines give quick and inexpensive guides for coloring.

Of course, many of the techniques I've just mentioned are not of use ONLY to the motion picture department. I just started out to show where a correlation of diazo materials could be helpful in an operation which might appear to be quite dissociate from the reproduction department. Much of the titling technique is also useful in preparation of slides, film strips, flip charts, posters and other display or audio-visual material. You may think that this does not have much to do with the photographic department, and in your case it might not. But for the making of short-run posters and signs, for example, they can be done neatly, quickly and inexpensively on diazo materials (see the story on General Motors' "Chartmaster" poster technique in our June '58 issue).

Any photo department that has to make slides or projectables for





GM Photographic has found diazotype materials to be ideal for the short-run production of posters and signs. In its Chartmaster process, plastic letters are set into a frame and then a sheet of reproduction paper is exposed through them (left). Duplicate copies are made on a direct light process machine (right).

overhead projection use is missing a good bet if it hasn't investigated the use of diazo materials for this. Even such normally dull subjects as charts, chemical formulas or mathematical symbols can be presented more interestingly (and more effectively) by adding a touch of color. And if you have to make more than one of each, you really save money and time with diazo foils. If you are budget-conscious and need to reproduce continuous-tone pictures for engineering reports, investigate what screened photographs can do for you on diazo. If you must cut corners and hold costs down, investigate the making of Diazochrome slides from color separation negatives. Diazotype film can save time and money in "proofing" short-run litho.

Until the time comes that all photo departments have their own diazo operations, I want to point out that there are already available some simple, small, inexpensive pieces of apparatus available for processing diazo materials. Many schools and visual aids departments have already discovered the small unit that Beseler makes for use by the armed forces; this consists of a small contact printer and a "developing box." Cooper-Trent has an inexpensive well-mounted printer and a developing unit called the Rotolite. Reproduction Engineering Corporation also makes a small machine called the "Blue Ray", that is portable and small. Although these are designed for making engineering drawings for a small shop or in the field, they are able to produce fine projection materials for a photo department. However, if you want to do some simple experimenting, a photo printing frame will do nicely and you can expose materials to sunshine and arc-lights. I have successfully used a couple of GE's Black Light Fluorescent tubes built into an old contact printer. Development can be done easily in a "pickle-jar"; I use a glass jar about 16 inches high, that has a 4½-inch-wide mouth. A small amount of ammonia on a cellulose sponge covered with a plastic frame to keep the diazo material from touching the damp sponge is all you need. Teachers have been using these simple but effective materials for making slides right in the class room. □

DRAFTING TRENDS

To prove how a Post *Tuf-Tex print stands up under wear and tear, we put one through the washing and drying cycle of this automatic laundry equipment. The print did not tear, lines remained crisp and black, the intermediate print gave excellent reproduction.*

New Mylar base for intermediate prints offers many advantages

Big news for firms looking for superior reproduction materials has been the recent introduction of Mylar base intermediate films (Mylar is DuPont's registered trademark).

Here is a polyester film with remarkable dimensional stability . . . and so tough it is impossible to tear with your bare hands. Post took this durable, high strength film and did some exciting things with it. They developed a special solution to coat the film as a reproduction master that produces intense, blackline print images easily and conveniently via direct positive printmaking equipment.

They named the new product, Vapo Tuf-Tex (Post 208PE).

Merely run Post 208PE through any ammonia process whiteprinter . . . quickly you have a virtually indestructible blackline intermediate. Just one trip through the printer does the job, no extra steps, no negatives, no muss. And, print image is just as crisp and sharp as can be . . . thanks to specially developed formulations used in Post's famous, exclusive "Controlled Coating" techniques.

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Best of all, a Tuf-Tex print really stands up under the punishment of frequent handling. Make extensive modifications . . . send it through the printer repeatedly . . . take it in and out of file frequently . . . make alterations . . . and still the print retains its strength and excellent printback characteristics.

Along with the dense blackline image on the glossy side, Tuf-Tex prints have an ideal matte surface on the other side that permits clean, crisp pencil or ink lines for changes and corrections. It's like drawing on a quality cloth. Available in base material thickness of either .003 or .005 inches, Post 208PE makes drawing easier and reproduction surer. Print images can be removed conveniently with a special single-stage eradicator (Post 240).

This fresh development in reproduction materials opens up new vistas well worth investigating for many different drafting applications.

For information on 208PE Tuf-Tex, see your local Post *blueprinter, or write to Frederick Post Company, 3644 N. Avondale, Chicago 18, Illinois.*

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Sipley on Patents

By DR. LOUIS W. SIPLEY, Director, American Museum of Photography

3-D ANIMATED CARTOONS

One of this year's interesting patents for the industrial photographic department which has more than usual interest in motion film production, relates to the production of animated cartoons. The device is intended to permit adjustment of scenery, as well as characters, for the taking of left-and right-eyed pictures for three-dimensional motion picture effects. The inventor's illustration accompanying the patent clearly shows a series of scene sheets, each of which is individually adjustable, plus a clear celluloid sheet on which the character sketches are made. An additional feature claimed by the inventor is the production of illusions of an object moving in the direction of the audience viewing the film on the screen.

The inventor presents four vital requirements for the creation of the illusion of depth: No. 1 is perspective; No. 2 is light and shade; No. 3 is color and 4 is parallax. In his claim as new, he states the following: In three-dimensional photography of animated cartoons, a plurality of slides for adjustably supporting a corresponding series of scenery sheets, a single actuated member directly engaging said slides for moving the slides and sheets into different variable parallax positions in taking series of left- and right-eyed pictures of the scene characterized by said sheets, a characterized Celluloid arranged over and movable relatively to said sheets, means for adjusting the position of said Celluloid with respect to the scenery sheets, and said last named means comprising a plurality of manually adjustable pegged bars. In closing, it should be mentioned that this device is intended to also permit the production of such 3-D pictures with a single film camera.

U. S. Patent 2,837,962: Seymour H. Kneitel, New York, N. Y., assignor to Paramount Pictures Corporation, New York, N. Y.

DOUBLE AERIAL CAMERA

One of the important requisites in aerial photography being maximum ground coverage per unit of exposure, a recent invention may offer a satisfactory solution to industrialists concerned with high costs of periodic aerial surveys of plants and property. The inventor of this camera approached the design of his new device with the idea of eliminating the many problems encountered in using two cameras mounted together to make simultaneous oblique pictures. The problems include such items as weight, overlapping, parallax, bulkiness, etc. To overcome these, the inventor has designed a double camera with a housing structure which has two sections, each with a lens and individually removable film spools. Lightness in weight and the reduction to a minimum of the distance between the focal systems solve other major problems of the aerial photographer.

U. S. Patent 2,841,063: Wallace Sidney Park, Louisville, Ky.

PROJECTING FILMS OF DIFFERENT WIDTHS

Some approach to solving the puzzle created by the large number of varied-width projection films has been made in this recent U. S. patent, which claims to permit the use in a film projection apparatus for projecting, selecting, 8mm films, double 8mm films, 8mm stereofilms and 16mm films. The inventor introduces his patent with the statement that prior devices for projecting films of different widths sometimes include complicated technical means for effecting the change from one film to another of different width. Such technical means require the manipulation of several mechanisms so that trouble is prone to occur. In this invention, the medial axis of the film picture coincides with the optical axis of the projection apparatus, whereby otherwise needed changes in the illuminating means, the objective, and other changes are avoided. In stereofilms, the medial plane coincides with the dividing plane between the two pictures. Changes in film operating means

occur automatically when the films and film guides are changed. The pivot of the film claw is also changed so that the use of different cams for operating the film claw when the films are changed is no longer necessary. The film transport rollers are wide enough to accommodate the widest film and so constructed that the film rests upon the rollers only with the edges of the film strip, thereby avoiding damage to the film.

U. S. Patent 2,834,249: Erwin May, Wetzler, Germany, assignor to Ernest Leitz, G.m.b.H, Wetzler, Germany.

PHOTO COPYING

continued from page 56

original indexing is still in use. The easy readability of the Neoflow reduction greatly helped in sorting the cards. Many of these small copies can be read without the aid of a glass; others may require an ordinary reading glass.

Whenever it becomes necessary, full-size blow-backs are made from the card-size prints on Peerless Projection Vellum. The blow-back projector is constructed similarly to the camera. The reduced-size card is fed on a conveyor over an illuminated slot. The image is picked up and passed through the optical system, which consists of a single lens and a series of mirrors, and is focussed on the sensitized material which travels in synchronous motion with the card.

The Neoflow Vellum which is now recommended for use in making enlargements in the current blow-back cameras has an ASA speed rating of 25. It travels through the camera at a speed of 10 feet per minute and comes in 350 feet rolls and in widths up to 30 inches.

The enlargement ratio ranges from 1:2 up to 1:7. From a 3" x 5" card, the largest enlargement possible through the blow-back projector is 21" x 35". The quality of the enlargement will depend considerably on the quality of the original reduced-size card and the type of material on which it is printed. When the reduction ratio is up around eight diameters, a high resolving power material should be used for making the card, assuring best results on the blow-back. R. S.

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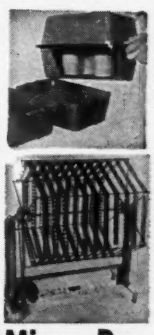

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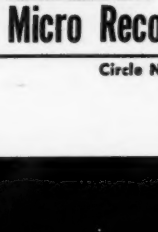

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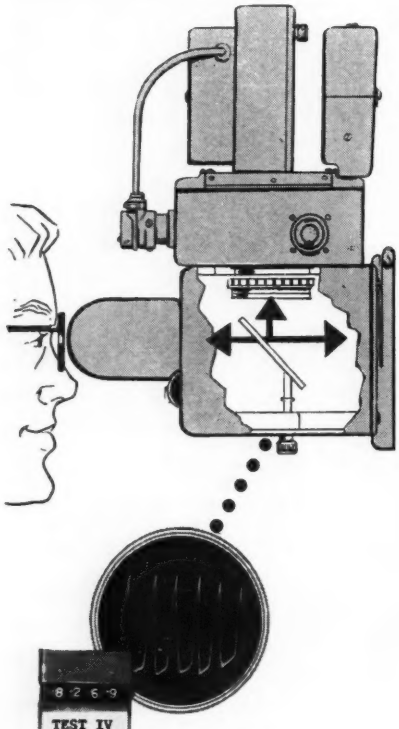
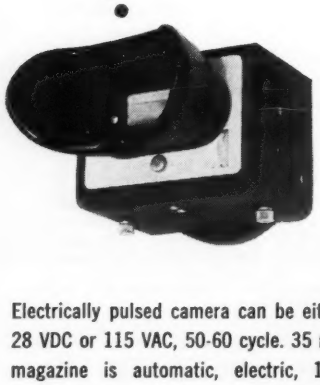


DATA RECORDING chamber, a KD-5 feature, automatically identifies each frame by number, time or writing.



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PHOTOGRAPHIC
Science and Instrumentation

by JOHN WADDELL, Technical Consultant

Learning Scientific Photography

Advances in automation, the development of machinery that moves at phenomenal speeds, the increased applications of liquid and solid fuels, the effects of the breaking of sonic barrier by aircraft and missiles are only some of the things that create a need for permanent recording and a means for analyzing events as they happen.

The increased use of photography for these purposes makes it imperative that the industrial photographer avail himself of every opportunity to secure further education in the basic principles of engineering and science. A knowledge of electrical and mechanical engineering, as well as physics and chemistry, is mandatory. Having this additional comprehension, the industrial photographer will become more valuable to engineers with whom he works. There have been instances when scientific and recording photography have been taken away from the photographic departments and placed in the engineering departments because the photographers lacked a working knowledge of the engineering sciences necessary for rendering an analytical service.

Few Available Courses

There are few, if any, courses in photographic instrumentation offered the engineer in his college curriculum. This is a fact that has hindered the extensive use of photography in research and industry in many instances.

Textbooks on photographic instrumentation are scarce. All the high speed motion picture photographic texts can be held in one hand. There is an increasing number of magazine articles appearing, but they have been so widespread that to follow them would require more time than most influential and technical photographers possess.

A great number of research laboratories use cameras extensively for analytical work, but management too frequently has to be "sold" on the benefits of photographic instrumentation. It had to be proved that stroboscopes and cathode ray oscilloscopes are valuable tools of analysis before management was willing to make the capital expenditures for buying these instruments. Cameras fall into a similar catagory. When their value to industry has been proved, management will be willing to make the expenditures for them. The burden of such proof lies in the presentation to management of the problems and solution by either the photographic or engineering department. Such a presentation should not be confined to a specific problem which has arisen, but it should be an all-inclusive survey as to where engineering photography can be used throughout the plant – in the research and development laboratories, in production and in quality control. Frequently, photography is thought of only as a last resort for analytical purposes.

Time Lapse Photography

In one case, a time lapse camera was set up to record instrument readings as a trans-oceanic cable was being fabricated. In reading out the film, it was found that there had been a deviation from the stipulated readings during the night. Luckily, a footage recorder on the cable machine was being photographed simultaneously and it was possible to locate the faulty portion of the cable and to discard it.

Industry has learned the value of photomicrography and of its application to metallurgy and biology. As a result of this, optical manufacturers have improved their products to the point where the taking of pictures through the microscope is almost foolproof. This industrial metamorphosis has taken over 50 years. (It is interesting to note that because of the efficiency to which light sources have been developed for photomicrography, those same sources can be used for taking high speed motion pictures through the microscope – but more about that later.)

Photographic instrumentation in

industry can be put to the greatest use during a recession. The following can be aided greatly through the use of photography:

1. **The study of production lines to secure improved operation of the fabricating machinery.** A thorough review of rejection rates can be made by the production control staff and, whenever the rates are greater than one per cent, a call be made to the photographic group for a pictorial analysis. Where organizations are using "incentive bonus" systems, this will mean a fatter pay check and eventually larger dividends for the stockholders.
2. **The study of production improvement.** Engineering time is more available during a recession and, therefore, improved performance of existing products can be reviewed. In many cases, the next year's models can be made more efficient by eliminating "the bugs" found through photographic analyses.
3. **The development of new products.** Because the engineers have had it demonstrated that photography has aided them on production problems and on product improvement, they are using photography to assist them in new designs, through research and development stages, through pre-production and then through environmental testing programs.

Better Equipment Coming

As the consumer market of today expands, the consumer is demanding more efficient operation of equipment. Equipment must be built to operate in the tropics and in the arctic, and it must operate under conditions of exceedingly high and exceedingly low humidity. Toward this end, data recording cameras, multiple image still cameras, time lapse cameras, high speed motion picture cameras, ultra high speed shutter cameras, image scanning and dissection cameras, and streak cameras will aid and abet these demands. Much photographic equipment is being designed so that it will operate from it own portable power supply, on mobile equipment or in isolated locations where power is not available. The photographer should be aware of the purpose of all these cameras. When the engineering department comes to the photographic

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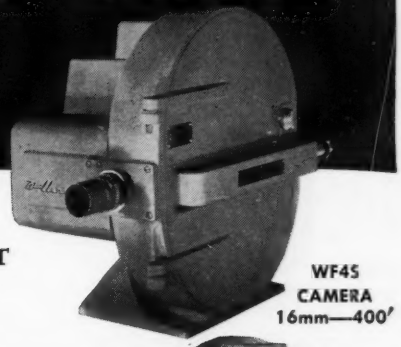

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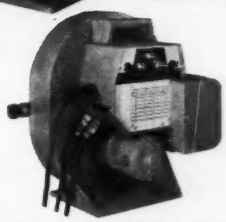

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group for recommendations for the best equipment to secure to do a given job, the industrial photographer should be able to give out the correct information. If there is an application for high speed photography, obviously a careful survey of existing equipment must be made for the most intelligent answers.

Cameras are not the only items of which the industrial photographer must have knowledge. Photographic instrumentation includes:

(1) optics,
(2) light sources,
(3) control equipment,
(4) power supplies,
(5) sensitized materials,
(6) processing equipment,
(7) data reduction equipment.

Knowledge of existing equipment is only part of the requisite for photographic analyses; the technical photographer must gain a knowledge of applications, of how and when to use the equipment. Until texts on the subject are written, experience will be his greatest teacher.

Government agencies and the aircraft industry have been the largest users of photographic instrumentation to date. There is a trend toward its increasing use in industry. In a letter received from Germany, it was cited that 90 per cent of the use of high speed photography was for the military and 10 per cent for industry. The ratio is not nearly that exaggerated in the United States.

Manufacturer Problems

The equipment manufacturer has his problems as well. In a new rapidly developing field, his product has to be good. If in the rotating prism cameras, one turned out to be a "clunker," more damage could be done to his reputation in a short time than could be repaired in years. Cameras of this type look quite simple, but there are "tricks of the trade" in making one work without picture jump. It must have good optical quality, perform reliably, operate simply and be built ruggedly enough to withstand hard usage in the laboratory and field.

Practically all of the manufacturers of cameras have developed their equipment without subsidization and, therefore, they have had to be extremely careful in their design parameters so that a specific design would be applicable to the maximum number of uses. There is one manufacturer of data recording cameras who has a large number of models for his basic camera – each model having specific design details for an end use by the consumer. Each modification costs money and, therefore, it has to be added to the cost of the unit. Such modifications have to be amortized over the first runs because it would not be wise to depend on repeat business.

Hand-Tooled Cameras

The instrumentation camera is expensive to build because of small quantity production. These cameras are practically all hand-made or hand-modified. The camera, too, must be neither under-engineered nor over-engineered.

The manufacturer also has the problem of reaching his consumer. The prime methods that have been used to date have been:

(1) direct advertising, both space and mail;
(2) through the medium of newsletters;
(3) by giving lecture-demonstrations to groups and individual users;
(4) by offering short courses of instruction to users and prospective consumers;
(5) by having trained personnel available for consultation.

Obviously, such a program is adding to the cost of sales. It is granted that the manufacturer learns many new things in the field, but a realistic look must be taken at costs of development and sales in bringing a new camera into production.

There is a great need for many types of cameras and auxiliary equipment, for some of which the total demand is but for 25 or 50 cameras, one each to individual users.

Prohibitive Costs

Manufacturers would like to provide instruction books which could cover techniques as well as the operating instructions for the specific equipment, but again the cost of doing this becomes prohibitive.

Another purpose of this series will be to assist the industrial photographer to evaluate the field of photographic instrumentation and techniques so that he may prove to management that their applications are a lucrative and worth-while undertaking.

SIMPLIFICATION

continued from page 38

In the film, scenes of the old system are shown to illustrate how cumbersome and burdensome a regular purchasing procedure can become when applied to minor purchases like books and magazines. It then follows the point-by-point thinking of the team that solved the problem using the actual system analysis charts used to develop improvements.

Savings accomplished are summarized in the film's conclusion: materials reduction from 15 to four sheets of paper, reduction of order travel between departments by 79 percent and work element reduction by 80 percent.

These statistical savings were given dramatic impact through simple photo improvisations devised by the cameraman to implement the script of work simplification engineer Bruce Karnes.

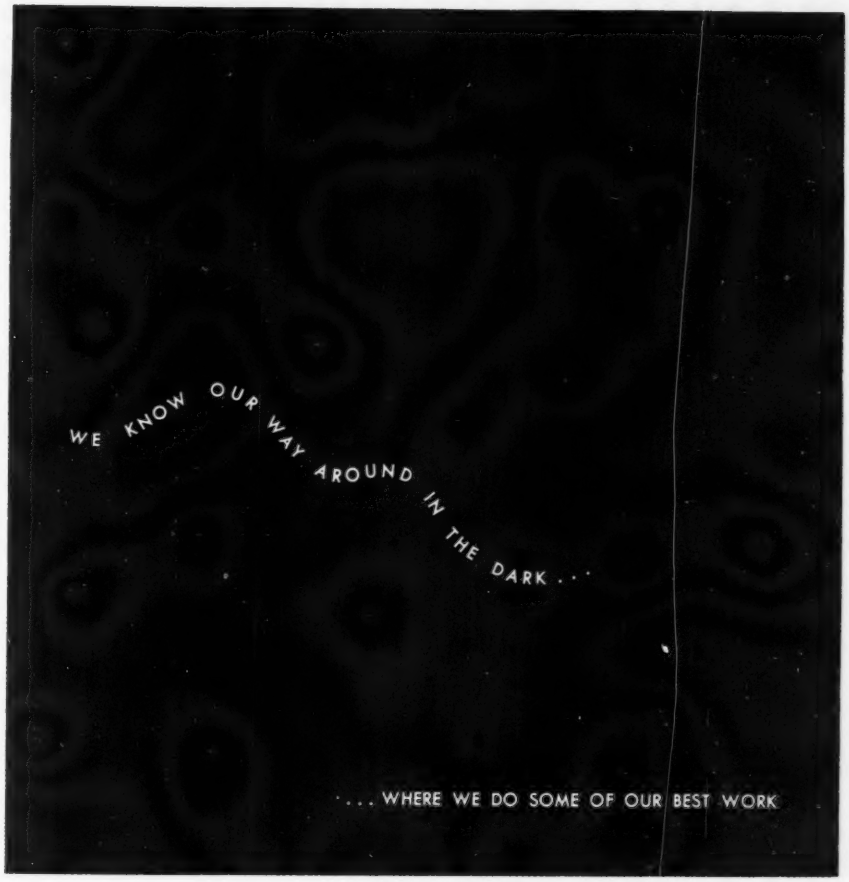
To illustrate the charting and increase legibility, the telephoto was used at a distance of three and one-half to four feet from the chart. A pointer was employed with pan shots following the pointer to explain the chart symbols.

Motion Savings

Motion savings were demonstrated by showing a mail boy retracing his steps at an increased rate of speed. This was done by turning the camera upside down and filming at eight frames a second. In editing, the scene was cut and turned end to end to produce the desired effect.

The final scene, a sunrise over Lake Michigan, also presented a problem in that the lake horizon lies to the west. To simulate a rising sun, a setting sun was photographed upside down and later spliced in right side up. A special bracket for the camera and tripod had to be made to hold the camera rigid. The scene was shot at eight frames per second to speed up the action. Overall film speed was 24 frames per second so that prints could be made with an optical sound track from the original magnetic sound stripe.

So thoroughly effective was the film that it won first prize in the methods improvement contest, office division, sponsored by the Industrial Management Society. □



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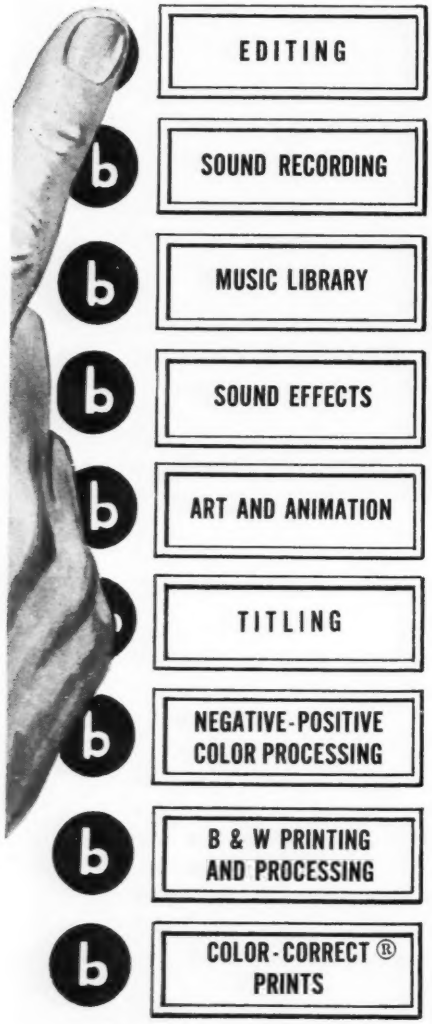

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Movie Clinic

Selecting the Microphone

In organizing an industrial motion picture sound recording system, possibly no other single piece of equipment is as difficult to select as the microphone. Final selection, of course, depends on the type of work the microphone is to do since different microphones are designed to do different jobs. However, there are some general characteristics that should be considered before making a choice.

First, for most film recording it is advisable to have a directional microphone that will record from one direction rather than from all sides. The obvious advantage is that undesirable noises that are in the same vicinity with the sound to be recorded can be blocked out. One example would be a room that is noisy at one end. In this case, the directional microphone is set to face the sound desired and away from the noisy area.

Volume Reduced

The sound is not completely blocked out on the other sides but the volume is considerably reduced. The ratio of volume between the side that records and the reverse side is called front and back ratio and it may be as much as 20 or 25 decibels.

Some directional microphones are made so that they can be converted from directional to non-directional (or omni-directional) by the flick of a switch on the microphone, itself. In addition, directional microphones can be adapted by simple ingenuity. For example turning a microphone on its side and lifting it above a group of speakers so that its live side is pointed down makes any directional microphone an effective non-directional one.

Another important consideration is the pre-amplification of sound at or near the microphone. The output level of energy coming out of any microphone is extremely low. It has to be amplified electrically to get sufficient working volume. For this reason, pre-amplification is desirable.

Sometimes pre-amplifiers are built into the main amplifier of a recording channel but generally it is the first two tubes of amplification which are referred to as "pre-amplifiers."

A current tendency is to build the amplifier directly into the microphone, itself. The advantage is that the sound is immediately amplified in volume and, as a stronger signal going through the microphone cable, can override any other induced current that might come from electrical wires running to the lamps, from AC cords, etc. Without this amplification, electrical disturbances may get into a signal running through microphone cables. The louder a signal is when it leaves the microphone, the greater chance it has to force its way through other electrical obstructions.

There are two other main advantages to a built-in pre-amplifier. It allows the use of a longer cable which can be extremely valuable under certain conditions. The greater volume being fed into the recorder also makes it possible to back up volume control and use less "gain."

Frequency Response

Another important consideration is a microphone's frequency response. Curiously, in this area the best available equipment may be too good for the job. Specifically, some of the finer microphones have extended frequency ranges up to 18,000 cycles and are priced accordingly. For film work, such a range is not generally necessary; a response of 13,000 cycles is quite acceptable. In fact, the higher range can be a disadvantage in recording some types of sound. A high frequency microphone is more difficult to control than one with a less extended range when dealing with sound that has a high frequency response, rich in harmonics.

Frequency response is usually indicated by the microphone manufacturer. A good way of checking microphones when the final choice is about to be made is to actually try them out. Seat an announcer

with copy before two or three microphones and have him read steadily while switching back and forth between microphones. Listen to the differences and pick the best sounding if all other considerations are equal.

The type of diaphragm built into the microphone should be given strong consideration. Ribbon diaphragms are highly sensitive to wind, shock and vibration. If much location work is expected, a condenser type – using a tight-stretched diaphragm – is preferable.

Equally important for consideration is the impedance level of the microphone. Generally speaking, high impedance microphones are prone to trouble because they may pick up electrical interferences in the recording zone. This further limits the length of microphone cord practical to use with a high impedance microphone. The standard impedance for microphones in professional use today is 50 ohms, a low impedance level. □

SOLUTION

continued from page 36

on these two compounds proved that the guanyl thiourea phosphate gave generally superior results.

The question arises as to why guanyl thiourea phosphate works, whereas, thiourea does not, inasmuch, as their reactions are very similar. The reason for this appears to be in the mechanism of the thiourea reaction. Before the thiourea can attack the brownprint image, it must migrate to the surface of the diazo intermediate and then offset to the brownprint. Guanyl thiourea phosphate, being a salt of phosphoric acid, is not subject to this migration and offset. Apparently the problem is solved.

This research was conducted by Research Department personnel of Tecnifax Corporation, Holyoke, Mass., under the direction of Dr. David P. Habib. In order to eliminate any suspicion of the undesired quality from the minds of users of diazo intermediates, Tecnifax is disclosing the results of its research, for unrestricted use by diazotype producers. □

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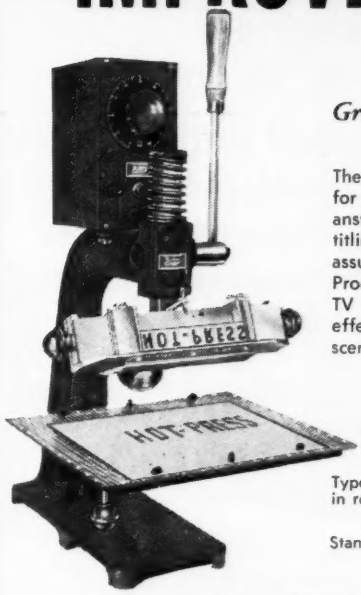

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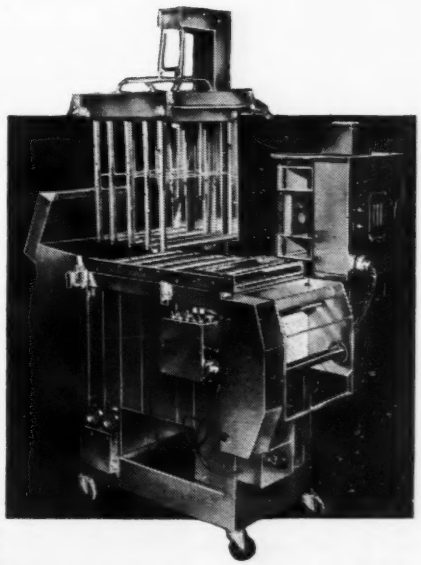

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NEW PRODUCTS

continued from page 15

hour, a micrometic method of adjusting coating thickness, and variable width stripes. The dry-box uses filtered, heated air, and has a plexiglass door. Sound balancing tracks are applied in one operation. Adjustable polishers impart high gloss and minimize head wear. The SOSound Magnetic Striping Machine guarantees permanent adhesion, even on the exposed emulsion surface. Dimensions are 56" x 12" x 12". Weight 150 lbs.

Photocopy Machine 110

Copycat Corporation has developed a photocopy machine that is said to give a finished copy in 12 seconds. The new machine runs practically unattended, always ready for use. The machine can be mounted on the wall. It comes in two sizes — Model F-9 for copies 9" wide by any length and Model F-14 for copies up to 14" wide by any length.

Xerographic Cameras 111

Two new xerographic cameras designed for the Xerox Model 1218 copying equipment have been introduced by *Haloid Xerox Inc.* The Mark III and Mark IV cameras, with copyboards of 30" x 40" and 34" x 44", respectively, permit the copying of larger original documents than was formerly feasible. The Mark III and Mark IV cameras are of rugged construction, and contain improved lens systems designed to assure complete optical coverage of the larger copyboards. The Mark III camera has a 19" focal length lens and the Mark IV has a 24" lens. The new cameras feature four 1500-watt, double-banked projection lamps. Individual adjustment of lamp positions is permitted for even lighting.

35mm Cameras 112

The new Samoca 35mm cameras, Models M35 and L28 are now being manufactured by *Samoca Camera Co.* of Tokyo. Both cameras have bright-frame finders. The Samoca M35 is equipped with an *f*/3.5 coated lens

and features rapid lever wind ad-

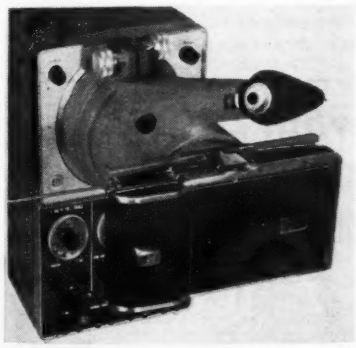
vance, coupled rangefinder, shutter speeds 1 sec. to 1/300th and all-metal construction. The Samoca L28 features a built-in exposure meter and high-speed *f*/2.8 coated lens. Price for M35: $34.95. Price for 1.28: $49.95.

Tape Recorder 113

A new 2-speed high fidelity portable tape recorder which takes up to a 7" reel has been introduced by the *Telectrosonic Corporation*. The new recorder, model 1971, weighs 19½ lbs and offers dual speeds of 3¾ ips and 7½ ips with dual track recording. Price: $99.95.

Oscilloscope-Record Camera 114

A 1:1 object-to-image ratio, and a multiple exposure feature which permits more than one trace per frame in either the long or short dimension of the film are among the major offerings in a new oscilloscope-record camera developed by *Allen B. DuMont Laboratories, Inc.* The Du Mont Type 353 camera is designed for use with any standard 5" oscilloscope and is normally supplied with a Polaroid-Land Back. It can be converted into a Graflex camera unit using standard

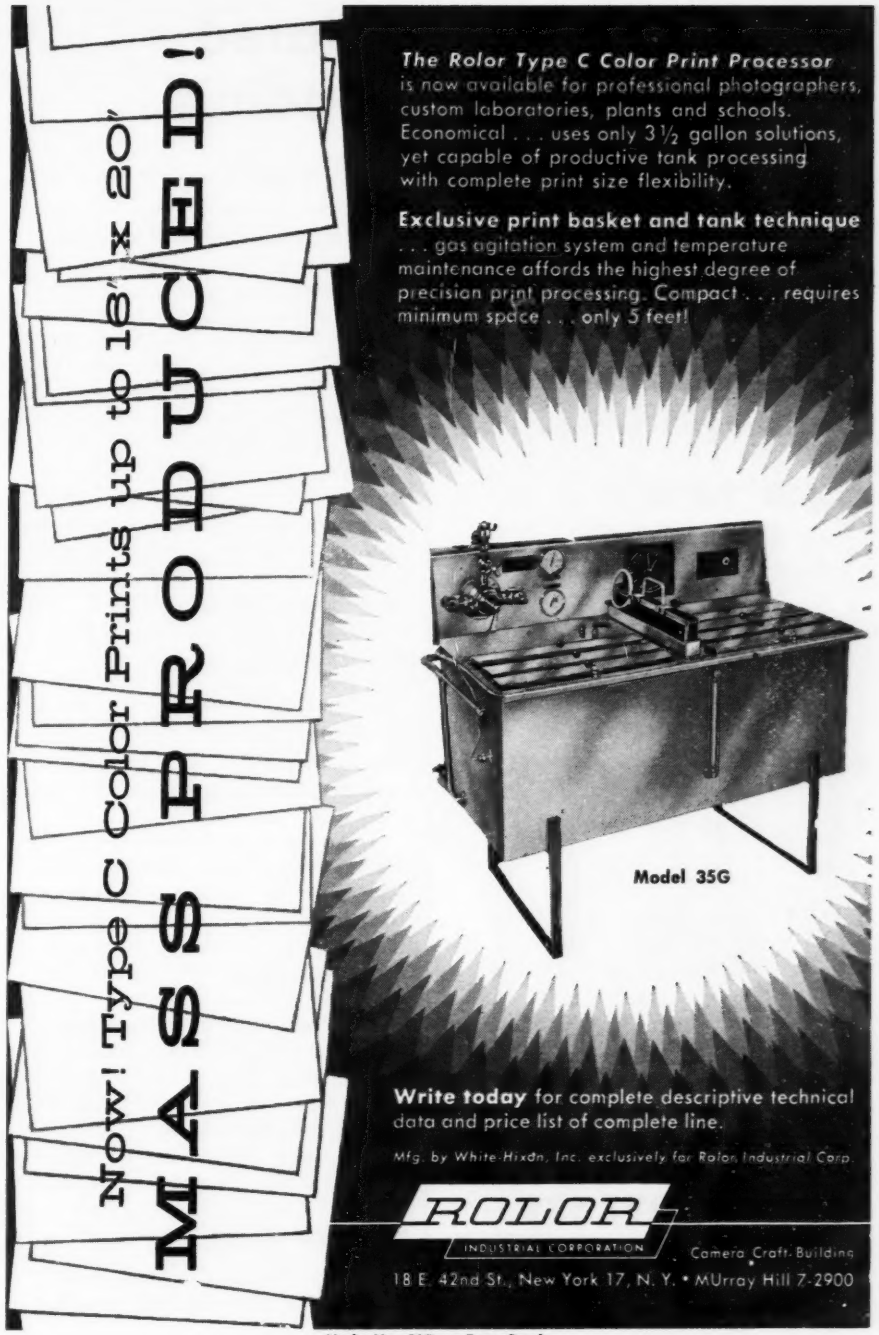


size 120 roll, sheet or pack film, with accessories. Wave-form comparison and film economy are made possible because of a sliding detent-back feature. Either a *f*/1.9 or *f*/2.8 lens is available. The shutter adjustment range for the f/1.9 is one second to 1/100 second plus time or bulb, and 1/25 second to 1/100 second time and bulb for the *f*/2.8 lens. Monocular viewing facilities permit direct viewing of the trace simultaneous with the taking of pictures without the danger of fogging the film. The camera is 13" long, 9" high and 9½" wide.

40mm Lens 115

Continuous focusing from infinity to 4" without need for extension tubes or other accessories has now become possible with Arriflex 16mm and 35-mm cameras. The new 40mm *f*/2.8 Kilfitt Makro Kilar A in Arri mount permits filling the film frame with a subject area as small as 19/32" x ⅞" with the Arriflex 16, and 1½" x 1¾"

continued on page 73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Related Reading

Available Light and Your Camera

Editor: George B. Wright, Amphoto, New York, 182 pp., $5.00

The last published book of the late George Wright, whose adult life was devoted to all aspects of photography, is an interesting though surface study of the applications of available light photography.

In this revised edition, eleven noted photographers contribute chapters detailing their experience with available light photography in their individual areas of specialization. No one is giving away any secrets but their cumulative efforts make enjoyable reading.

Of particular interest to industrial photographers may be the chapter on "Available Light in Industrial Work" by Morris Gordon of Western Electric. Gordon covers general industrial plant subjects as well as informal portraits of executives at work.

The subject of company portraits is also covered by photojournalist Dan Weiner whose portraiture techniques (for *Fortune* and other magazines) are applicable when such assignments are given to the photo department.

This well illustrated volume can be recommended as a general reference work on a specialized area of lighting; unfortunately, it is not detailed enough to make it a "must" when your reading time and dollar are restricted. — **M.M.B.**

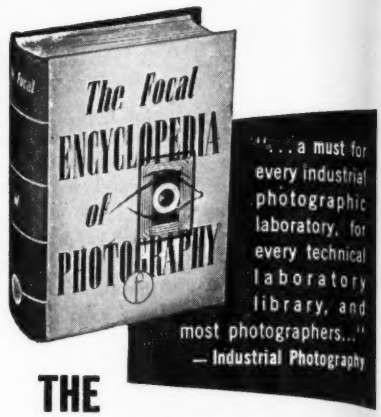
Rotha on the Film

Paul Rotha, Essential Books, Inc., Fairlawn, New Jersey, 338 pp., $7.50.

This volume is a collection of commentaries selected by the author from his more than 1500 articles and lectures published during the past 30 years.

Rotha's observations range over 60 years of movie making with knowing analyses of such great cinema figures as the elder Douglas Fairbanks, J. Arthur Rank and Charlie Chaplin. He also offers a penetrating analysis of the modern film masters.

Film society members and all serious followers of the motion picture industry will find Rotha's comments on over 250 films helpful in assessing the entire industry. The book has been interestingly illustrated with stills from a number of films. — **R.S.**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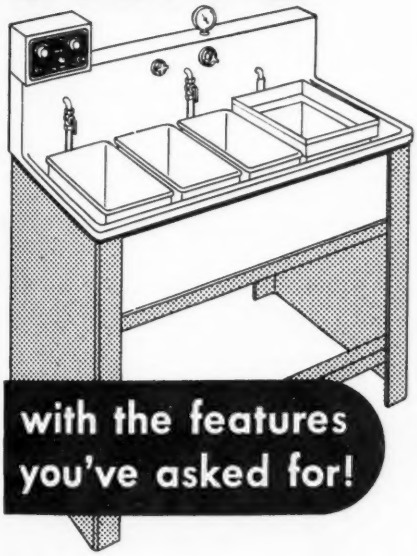

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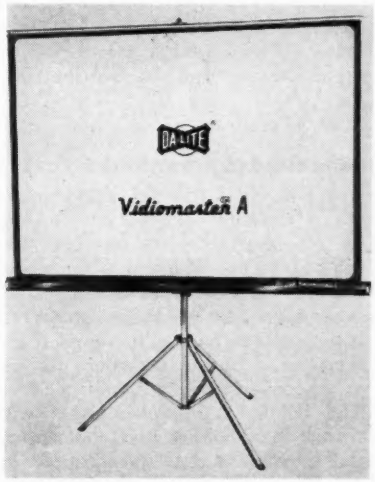
NEW PRODUCTS

continued from page 71

with Arriflex 35. The construction of the critically correct lens incorporates an extra long helical mount to permit covering the extreme focusing range. *F*-stops from 2.8 to 22 may be preset to permit focusing with lens wide open, and instant change to the preselected *f*-stop for shooting. A built-in deep lens shade takes standard Series V filters. The lens is distributed by *Kling Photo Corporation*. Price: $195.

Projection Screens 116

The Da-Lite Screen Company is merchandising several new projection screens. The new Vidiomaster A is a tripod model which features White Magic V-4 Glass Beaded screen fabric. The screen features legs and tripod bracket of heavy gauge aluminum. Designed for screen increased stability, it will support over ten times its own weight. The Vidiomaster Wonder-Lite features the new Da-Lite Lenticular reflection surface. The screen is also a tripod model which uses the new Lenticular fabric and is optically corrected for controlled minute peaks and valleys. The screen retains its shape indefinitely with no sag and no laminations. Price of White Magic V-4: $74.50. Price of Wonder-Lite: $44.95.



Canon VI-T 35mm Camera 117

The new Canon VI-T 35mm camera, released in the U.S. by *Scopus/-Brockway Inc.*, incorporates well-known Canon features and adds both a redesigned viewfinder system and a stainless steel focal plane shutter. The latter, replacing traditional cloth shutters, is encased in a flexible vinyl coating that prevents accidental burning by a concentration of light rays on the focal plane. The viewfinder is

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a tri-position brilliant single window for 50mm, 35mm and 100mm lenses. The viewfinder system also incorporates both internal and accessory parallax control. Other features of the new camera are a single-stroke film advance and shutter-cock trigger, detachable exposure meter, safety-lock film loading, built in timer and flash synchronization for FP, M and SF bulbs as well as electronic flash. Price: $289 with 50mm *f*/2.8 lens, up to $429.50 with 50mm *f*/1.2 lens.

Robot Recorder 118

Equipped with its own built-in spring motor for automatic film transport, shutter cocking and film counting, the Robot Recorder 35mm camera forms the nucleus of a complete electro-automatic recording system, which can be adapted to any photographic registration assignment in science or industry. The Robot Recorder, stripped of rangefinder and viewfinder, is available for 24 x 36mm (double), 24 x 24mm (square) and 18 x 24mm (single) frame sizes. Shutter speeds range from ½ to 1/500 sec. and B with built-in M and X synchronization. Interchangeable, bayonet mounted Zeiss and Schneider lenses range from 30mm wide angle up to 300mm telephoto. Distributed in the U.S. by *Karl Heitz, Inc.* Price: $149 without lens.

Polaroid 4x5 Film Holder 119

A Polaroid Land 4x5 Film Holder which instantly adapts 4x5 cameras for 60-second pictures has been developed by the *Polaroid Corporation.* One of the two types of film to be marketed for the holder has an acetate base negative that can be retained and reprocessed in the darkroom for use as a conventional printing negative. The holder is interchangeable with regular film holders and conforms to the principal A.S.A. specifications for 4x5 film holders of the lock rib type. It fits press and view cameras equipped with Graphic, Graflok and similar type backs. Price: $49.95.

Diazo Paper 120

Faster output from diazo machines, with no sacrifice of print density, has been made possible by a new innovation in diazo sensitized papers developed by *Keuffel & Esser Co.* The new paper, Helios Blue 11, can be used to reproduce old, worn original drawings, sepia intermediates and for reproduction on small diazo equipment. Samples are available for in-plant testing.

16mm Camera 121

The Bolex H-16M by *Paillard Incorporated* is a single lens version of the Bolex H-16 system. It features a "preview finder" for instant parallax correction and rapid focal length adjustment. The camera takes 100 feet

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of 16mm single- or double-perforated film. It runs at seven governor-controlled speeds, with the convenience of forward and back winding for trick effects. Film loading is through the rapid automatic film threader. The lens plate is a standard C-mount and accepts all standard, wide angle and telephoto lenses. The camera comes with a Lytar 1" *f*/1.8 F.M. lens.

Photocopy Machine 122

A compact office photocopy machine featuring fast feed is being offered by *American Photocopy Equipment Company*. Lightweight and portable, the new APECO Director "Auto-Stat" will reproduce any original office-sized document in approximately 19 seconds. Price: Approximately $200.

Trigger-Grip Handle 123

A Trigger-grip handle that fits all Filmo 70 Series cameras (also available for Filmo 240 TA Camera) is being marketed by *National Cine Equipment, Inc.* A spring loaded trigger shutter release depresses a hook extension over the top of the Filmo Camera to release regular camera button. Tripod screw at the bottom of the handle holds camera securely in place. Contour of trigger-grip handle permits steady hand support with one hand while depressing trigger with the other hand. It is made of cast aluminum construction with a brown wrinkle finish. Price: $29.95.

Print Washer 124

Leedal announces an automatic, water-agitated print washer, the Sea Wave. This washer is operated solely by water power. There are no mechanical or electrical parts thus eliminating most maintenance and electrical shock hazard in the wet darkroom. Prints are constantly agitated and swished about in wash water by the gentle rocking and agitating motion. Prints cannot mat and are always kept separated. The agitation is controlled by water volume. The unit is constructed of type 316 stainless steel and consists of an inner and outer pan mounted on a "paintlock" base.

Film Processor 125

Micro Record Corp. has developed the Model D 31 film processor that can process 400 ft. of 8mm, 16mm, 35mm or 70mm film. The processor features corrosion resistant tank, and automatic daylight operation. Low-cost processing and uniform images are developed because of continuous agitation caused by the repeated passage of the film through the solutions. The processor features standard equipment such as driving mechanism, light trap, 4-nested tanks, 3 ft. of rubber hose with faucet adapter and 1 pair reels as optional equipment. Price: $390.

continued on page 78

FINER WORKMANSHIP MEANS LONGER PROJECTOR LIFE

Operation of projector mechanisms in "run-in" cabinet is one of many quality controls that assures long life of Victor projectors.

Victor sets highest standards for projector quality

Victor 16mm sound projectors have justly earned a reputation for turning in *extra* years of trouble-free service. Just take a look at any new Victor to see why—and you'll find the answer in quality workmanship and materials that meet the most rigid specifications.

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This kind of attention to detail has always paid off in greater dependability and lower maintenance costs with Victor projectors. So compare workmanship before you order your next projector—and you'll be sure to specify Victor.

NEW VICTORS FOR OLD — FREE

We wish to obtain the ten oldest Victor sound-on-film projectors still in use—and offer to exchange them for brand-new Victor Assembly 10 models at absolutely no cost. If you believe that your Victor qualifies, simply fill out coupon and mail before this offer expires on December 31, 1958.

MAIL BEFORE DECEMBER 31, 1958

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Standardization of Microfilming

by ERNEST P. TAUBES
President, Photo Devices, Inc.

During the last ten years the photographic reproduction of documents has become big business. This surge can be directly attributed to new methods, materials and processes which make it possible to reproduce most any document directly in the office or engineering department within minutes without the necessity of sending it to specialized reproduction shops.

Eastman Kodak Company, for instance, estimates that industry wide sales have increased from a total of $103,000,000 in 1954 to about $185,000,000 in 1957 and they expect an additional increase of 10% to 20% in 1958.

Comes With Size

Whenever a commercial or industrial activity becomes large enough, standardization of processes, components and equipment becomes a very desirable and important activity.

This has been demonstrated by the growth of the American Standards Association from a very modest beginning in 1918, to an organization supported by all branches of commerce and industry today.

The American Standards Association established a photographic standards board a number of years ago which concerns itself with standardization of all phases of photography.

To properly evaluate and standardize all the various activities pertaining to photography in general, the photographic standards board has established six committees, each one concerned with a particular process or activity:

PH1 - Concerns itself with photographic films, plates and papers.

PH2 - Concerns itself with photographic sensitometry.

PH3 - Concerns itself with photographic apparatus.

PH4 - Concerns itself with photographic processing.

PH5 - Concerns itself with photographic reproduction of documents.

PH22 - Concerns itself with motion pictures.

Each one of these committees numbers among its members a cross section of the particular segment of photographic industry together with the ultimate users of the products or processes to be standardized.

This arrangement of users and manufacturers comprising a committee permits a proper balance of effort in each instance so that the final standards evolved in each committee benefits manufacturers and users alike.

Presently the American Standards Association has 263 approved photographic standards on its books and some 124 proposed standards in various stages of development.

PH5, the committee concerned with the photographic reproduction of documents, is one of the youngest committees of the American Standards Association and has a tremendous job cut out for itself to cover the field of photographic reproduction of documents with satisfactory and adequate standards. So far there are only five approved standards covering this field and eight other proposed standards are being prepared in the three subcommittees of PH5.

PH5-1 concerns itself with microtransparencies (commonly called microfilm); PH5-2 concerns itself with photographic reproduction of documents which can be read with the naked eye. This includes photocopy, Diazo, blueprint and all the newer production processes such as Verifax, split emulsion, Xerox, Thermofax, Electrofax, etc.

The following standards have been approved:

PH5.2-1957: Dimensions of Paper Sheets for Photographic Reproduction of Documents.

PH5.4-1957: Practice for Storage of Microfilm.

Z38.7.8-1947: Practice for Microfilms (a revised version is presently up for approval of the Photographic Standard Board).

Z38.7.9-1946: Specifications for microfilm readers (an up to date revision of this standard is presently up for vote of the entire sectional committee PH5).

X38.7.17-1946: Reels for Processed Microfilm (under revision in the subcommittee)).

The following proposed standards are being studied in the three subcommittees at the present time: glossary of terms; microfilming of engineering drawings; microopaques and microopaque readers; and quality of microtransparencies. Various revisions of other standards are also being considered.

The unprecedented growth of the photographic reproduction of

continued on next page

***THE AUTHOR** was educated at the University of Zurich and University of Vienna receiving a Masters in Mechanical and Electrical Engineering and a Doctorate of Technical Sciences. He has been engaged in research, development and general design engineering and was president of Microtronics, Inc. from 1944 to 1954. He was vice-president of Photostat Corporation from 1954 to 1956 when he assumed the presidency of Photo Devices, Inc. He is currently chairman of American Standards Association subcommittee on Standardization of Microtransparencies.*

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documents in the last few years has outstripped the efforts to standardize the various phases of this activity.

Writing a satisfactory standard for any process, activity or equipment is a slow and tedious job, since every sentence of a paragraph in a standard has to be carefully composed, edited and reedited until it satisfies every member of a committee.

One of the most controversial and difficult standards to write is a standard of quality of microtransparencies. This is due to the fact that most of the accepted concepts of measurement for sharpness, contrast, etc. have to be redefined and new concepts specified to properly describe the quality of a microfilm image. The word "resolution", for instance, has been accepted as a standard for measuring of sharpness throughout the photographic industry. However, it does not measure the legibility of a microfilm image, therefore, a new yardstick to measure legibility had to be evolved in the standards association before a standard of quality could be formulated.

Today we are far enough along so that proper standard of quality can be formulated within the near future.

Meetings Limited

Since each member contributes his time and effort without compensation, the number of meetings held each year is limited particularly due to the fact that a number of members have to travel considerable distance to get to the meeting place and spend considerable money to do so.

Standardization in every phase of commerce and industry benefits the public primarily, since it insures minimum quality of products and uniformity of components.

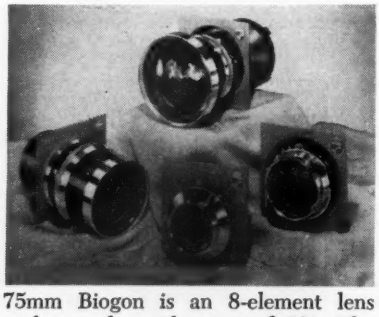
To speed up the activities of the committees and to get a greater number of standards prepared and approved, the public, as a whole, has to express its desire for such standards by requesting standardization of various phases of the photographic reproduction of documents from the American Standards Association and by joining actively the association and contributing to its support. □

NEW PRODUCTS

continued from page 75

Lens System 126

A new lens system designed and made exclusively for the Linhof Super Technika IV 4x5 camera by *Carl Zeiss* is now being introduced by Linhof dealers. The new system consists of the 75mm, *f*/4.5 Carl Zeiss Biogon; 135mm, *f*/3.5 Carl Zeiss Planar; 150-mm, *f*/4.5 Carl Zeiss Tessar; and the 250mm, *f*/5.6 Carl Zeiss Sonnar. The



75mm Biogon is an 8-element lens with a wide angle view of 90°. The lens permits use of camera movements and comes with a Compur Press Synchro Rapid Shutter with speeds from 1 to 1/500 sec., bulb; press focus stop; and M-X flash synchronization. Price: $750. The 135mm Planar employs 5-elements and offers a 65° angle of view. It comes with a Compur Press Synchro Rapid Shutter with speeds of 1 to 1/400 sec., bulb and time; press focus lever; self-timer; and M-X flash synchronization. Price: $275. The 150mm Tessar has a new optical glass and anti-reflection coating. It has 4-elements and 57° view. It is supplied with the same shutter as the Planar. Price: $189. The 250mm Sonnar is a 5-element telephoto. It comes with the same shutter as the Planar. Price: $495.

Auto Zoom Lens 127

Wollensak Optical Co. has developed a remote control zoom lens that gives better wide-angle and telephoto coverage. Designed specifically for the Vidicon TV camera, the lens was developed to maintain high resolution over the entire field without the sacrifice of contrast and perfect focus throughout the entire focal length range of 5:1. The Wollensak TV Raptar Auto Zoom Lens *f*/2.7 provides silent operation, a slow focus movement facilitating a more critical focus of the lens and dual range focal lengths. The Raptar Auto Zoom system uses 4 wires (plus ground) which provide remote control of the Zoom, focus and iris. Each function

is separately controlled by a key switch on the control panel.

Super-Farron Lens 128

The Farrand Optical Co., Inc. announces the Super-Farron *f*/0.87 lens. The lens has a 9 element system which covers a 30° field and provides high definition with excellent resolution and contrast over the entire photographic spectrum. The 76mm (3") focal length Super-Farron covers a flat field of 40mm (1.6") diameter and is suitable as an objective for Image Orthicon television cameras or for special 35mm photography. The lens is available with standard infinity correction for direct photography and can be supplied corrected for 16:1 or 4:1 conjugates for special purposes at higher cost. Price: $1500.

Skydrop 129

Skydrop by *Krank-N-Roll Mfg.* provides a seamless backdrop that is instantly available, smooth and spotlessly clean. It rolls down for use and rolls up for storage. Spring tension construction provides enough pressure to prevent accidental unrolling. The Skydrop is adaptable to seamless paper from 9 ft. to 12 ft. width, any length. It may be used on the ceiling, side or back wall.

200mm Lens 130

A new 200mm *f*/5.5 lens, made by *Piesker of Berlin*, W. Germany, has been introduced by Voss Photo Corporation, sole U. S. distributor. Named the Tele-Voss, this telephoto lens has a preset diaphragm which stops down to *f*/22 and focuses from 9 ft. to infinity. Fully color corrected, this lens fits all popular reflex type cameras from 35mm up to 2¼" sq. with interchangeable adaptors. Overall length is 4¾". Price: $79.50.

Telephoto Lens 131

Isco Optical Works has developed the Tele-Iscaron *f*/2.8, 180mm Telephoto lens for the Exakta. Featuring a five-element lens system, the lens has a preset diaphragm mechanism with 7 aperture settings from *f*/2.8 to *f*/22. The focusing mount permits focusing from infinity down to 6 feet. All the glass surfaces of the lens have been coated to reduce glare and reflection.

Reflex Camera 132

Sawyer's Mark IV is a twin lens reflex type camera taking 12 exposures of 4 cm x 4 cm size on No. 127 film. The Mark IV features a Topcor *f*/2.8 60mm 4-element lens of high resolving power. An *f*/2.8 60mm 3-element viewing lens assures bright reflection. The Fresnel lens installed beneath the ground glass screen increases the brightness of the reflected image by 2.5 times at the center and almost

continued on page 86

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4-power Push Button Intensity Control Speed-Lite . . . Variable light pattern with adjustable controls for concentrated modeling or broad floodlighting.

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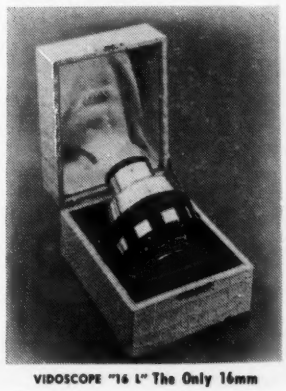

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New Free Literature

Keep posted on the latest developments in the photographic field. Each item listed below has a key number. For more information — without any obligation — circle that same number on the Readers Inquiry Card on page 81.

by BOBBA JEAN MOODY, Editorial Associate

GRAPHIC ARTS AND REPRODUCTION

Reproductions 201

Copy-Art Photographers. Details on services of reproduction lab.

Diazo Enlarger 202

Keuffel & Esser Co. Data on Helios enlarger using diazo paper.

Diazo 203

Tecnifax Corporation. Booklet offering advise on diazo.

Whiteprint Machines 204

Peck & Harvey Mfg. Corp. Catalogue of whiteprint machines, stainless steel photo lab equipment, blueprint, etc.

Platemaking Line 205

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The Filmsort Company. Step-by-step explanation of the Filmsort system for engineering-drawings in 16-page brochure.

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Graphic Systems. Brochure on convenient Boardmaster system of graphic visual control.

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Filmsounds, Inc. Detailed rate schedule and information on library of music and sound effects.

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102	108	114	120	126	132	138	144	150	157	164	171
103	109	115	121	127	133	139	145	151	158	165	172
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202	210	218	226	234	242	250	258	266	274	282	290
203	211	219	227	235	243	251	259	267	275	283	291
204	212	220	228	236	244	252	260	268	276	284	292
205	213	221	229	237	245	253	261	269	277	285	293
206	214	222	230	238	246	254	262	270	278	286	294
207	215	223	231	239	247	255	263	271	279	287	295

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503	518	533	548	563	578	593	609	625	641	657	673
504	519	534	549	564	579	594	610	626	642	658	674
505	520	535	550	565	580	595	611	627	643	659	675
506	521	536	551	566	581	596	612	628	644	660	676
507	522	537	552	567	582	597	613	629	645	661	677
508	523	538	553	568	583	598	614	630	646	662	678
509	524	539	554	569	584	599	615	631	647	663	679
510	525	540	555	570	585	600	616	632	648	664	680
511	526	541	556	571	586	601	617	633	649	665	681
512	527	542	557	572	587	602	618	634	650	666	682
513	528	543	558	573	588	603	619	635	651	667	683
514	529	544	559	574	589	604	620	636	652	668	684
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103	109	115	121	127	133	139	145	151	158	165	172
104	110	116	122	128	134	140	146	152	159	166	173
105	111	117	123	129	135	141	147	153	160	167	174
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NEW FREE LITERATURE

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205	213	221	229	237	245	253	261	269	277	285	293
206	214	222	230	238	246	254	262	270	278	286	294
207	215	223	231	239	247	255	263	271	279	287	295

ADVERTISEMENTS

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503	518	533	548	563	578	593	609	625	641	657	673
504	519	534	549	564	579	594	610	626	642	658	674
505	520	535	550	565	580	595	611	627	643	659	675
506	521	536	551	566	581	596	612	628	644	660	676
507	522	537	552	567	582	597	613	629	645	661	677
508	523	538	553	568	583	598	614	630	646	662	678
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511	526	541	556	571	586	601	617	633	649	665	681
512	527	542	557	572	587	602	618	634	650	666	682
513	528	543	558	573	588	603	619	635	651	667	683
514	529	544	559	574	589	604	620	636	652	668	684
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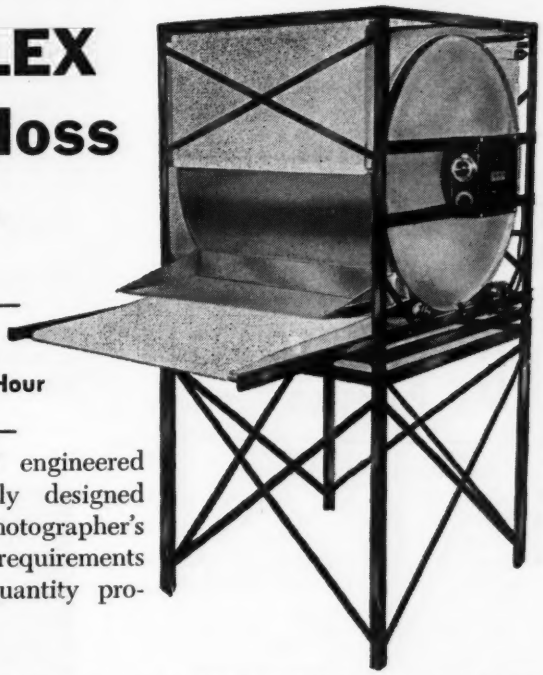

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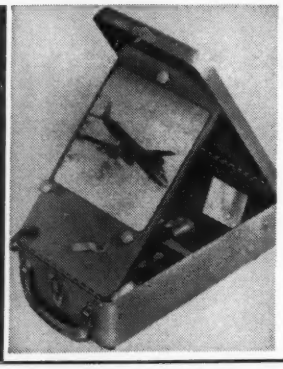

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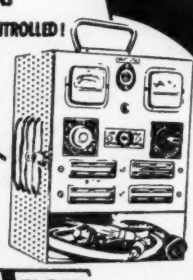

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ARTICLE
NEWS
SPEECH
PHOTO

Briefs

by RALPH SELITZER, Assistant Editor

New Camera Photographs Atoms in a Metal crystal

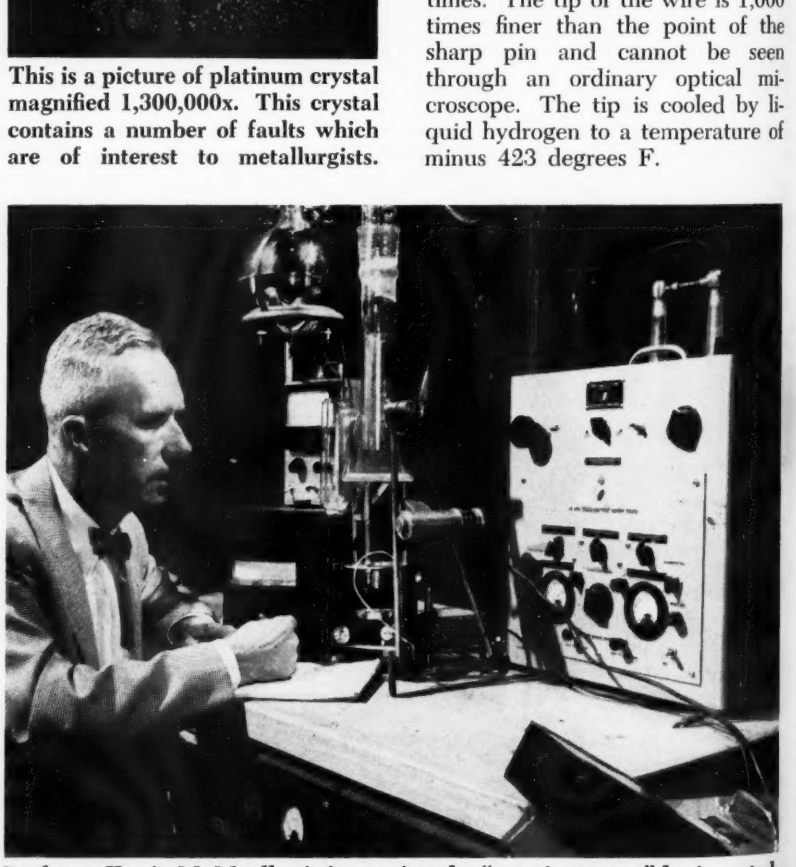
This is a picture of platinum crystal magnified 1,300,000x. This crystal contains a number of faults which are of interest to metallurgists.

A field ion microscope, developed by Dr. Erwin M. Mueller, makes it possible for the first time to take pictures of atoms in a metal crystal. Dr. Mueller is research professor of physics at Pennsylvania State University, University Park, Pa.

Professor Mueller's instrument does not resemble an optical microscope, but rather two thermos bottles one inside the other. Built entirely of glass, it contains sealed wires used to apply up to 30,000 volts. Within the evacuated glass tube is a fine tungsten wire.

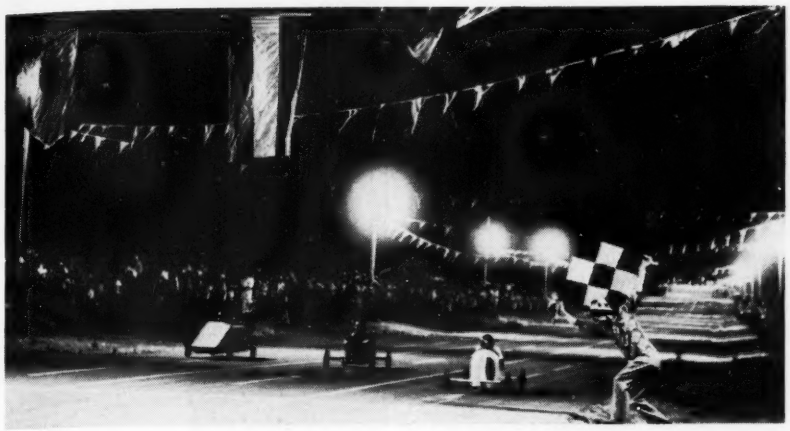
According to a New York Times report, the instrument operates in this manner:

The pattern of the atomic surface of the tip, from which helium atoms are bounced off as positive ions, is depicted on a fluorescent screen resembling a television tube, with magnifications up to 5,000,000 times. The tip of the wire is 1,000 times finer than the point of the sharp pin and cannot be seen through an ordinary optical microscope. The tip is cooled by liquid hydrogen to a temperature of minus 423 degrees F.



Professor Erwin M. Mueller is inspecting the "atomic camera" he invented. He is now working to improve the sharpness of the atomic crystals.

Lighting Up the Track



Some 280 powerful Sylvania movie lights transformed a desert track 12 miles south of downtown Tucson into a 1,000-foot-long ribbon of brilliant light for filming colored motion pictures of the annual Tucson Soap Box Derby held recently.

Illumination of nearly 4,000,000 beam candlepower was provided by the lighting network, supplied by Sylvania Electric Products Inc., for the 16mm movie cameras operated by a three-man General Motors Corp. Photographic Division film crew.

More than 7,000 feet of weather proof wire, coupled with special power lines and transformers, were required to supply the current drawn by the 375-watt R-32 movie lights mounted in four-light bar units 20 feet above the sloping track.

The Tucson Gas, Electric Light & Power Co. and Kermit Oestreich Electric Co. cooperated with Sylvania and General Motors in installation of the complicated lighting network.

Eight circuits supplied power to two light bars on each pole, staggered 50 feet apart on alternate sides of the 30-foot-wide track.

The derby was shot on 16mm Super Anscochrome tungsten-type color film with a Maurer camera and two Cine Specials.

Films of the Tucson competition will be included in a 30-minute colored movie on the derby program to be distributed later this year for television use in some 150 cities in the U. S., Canada, Venezuela, Germany and the Philippines.

Backward Camera

The Air Force has developed an infra-red camera which literally can reach backward into time for a picture, the Miami Herald reports.

In a copyrighted story by staff writer Mike Morgan, the Herald said the camera took a picture late at night from a reconnaissance plane of an empty parking lot. The developed picture showed cars which had been parked on the lot hours previously.

Morgan explained the operation and mechanism of the camera as follows:

"Extreme sensitive equipment which can distinguish in thousandths of a degree of heat registers the picture by heat contrasts of objects in the picture.

"For instance, the cars on the parking ground would radiate more or less heat than surrounding objects, or the cement lot. The greater the heat contrast, the easier it is to take the picture."

The Herald said the camera was developed primarily as a reconnaissance device. The concealment from this camera of bivouac areas, weapons, parks, tanks, airplanes or anything by camouflage measures is nearly impossible.

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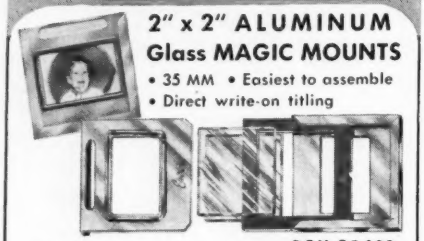

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Makes this the kind of organization that can economically solve your problems, bring your picture to successful conclusion.

[1]October, 1947, Palmer Magnetrack system used for first network radio show produced on tape, Bing Crosby, ABC Radio.

[2]developed by Palmer and accepted as "standard" by the industry in 1949.

[3]1952, Palmer Films made closed circuit video films of Peabody Award winning "Standard Hour" program on ABC-TV.

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NEW PRODUCTS

continued from page 79

10 times at the four corners. In addition, there is a 2.5 power magnifying glass to aid in critical "hair-line" focusing. Parallax compensating lines are etched on the ground glass and close-ups to about 26" can be made without the use of close-up adaptors.

Cronar Base 133

Conversion of a major part of its portrait, press and industrial film from acetate to Cronar polyester photographic film bases was announced by the *DuPont Photo Products Department* . Among the advantages of Cronar are these listed by DuPont: lies flat during all handling stages; dries 20 to 25 per cent faster than acetate films; permits very sharp enlargements since thin, smooth polyester base eliminates optical distortions; does not dimple and distort if inadvertently dried without proper removal of water droplets; and features retouchable emulsions, for improved portraiture.

Litho Plate 134

A new 47½" by 59" presensitized photo offset lithographic plate has been introduced to the market by *Minnesota Mining and Manufacturing Company*. The new size plate is made of 12-mil aluminum and like all 3M plates, it features a smooth surface and machine coating for truer reproduction. Price: $12.80 each.

Water Filter 135

Klemm Micro H2 Water Filter by *Klemm Products* removes solids from water and is useful in photo development. The water filter incorporates an exclusive filtering element called "Chemistone" that is said to remove sand, silt, metal, scale rust and algae down to 10-20 microns.

Tape Recorders 136

Roberts Electronics Inc. has introduced two new matched units, the 90-S Stereo Recorder and the A901 Recording Amplifier. The 90-S Stereo Recorder incorporates an amplifier, pre-amplifier, and speaker with dual channel outputs and a precision-balanced hysteresis-synchronous drive motor for perfect pitch and sound control. The A-901 Recording Amplifier includes separate microphone, a VU meter for second channel balance, and a woofer-tweeter speaker combination for full dimensional playback sound.

Magazine Extended 137

Both the Robot Recorder and the Robot Royal, 35mm cameras with

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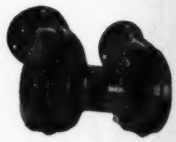

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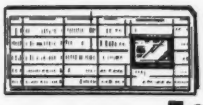

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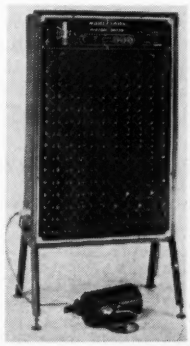
built-in motors, are supplied with detachable backs, which can be replaced by a lightweight and compact 30′ magazine to provide up to 260 24x36-mm double, 400 24x24mm square or 520 18x24mm single frames without reloading.

The winding mechanism is controlled by a gear located below the take-up knob of the camera, while a special wheel operates the frame counter of the 30′ camera back. Both film spools are located on one side of the magazine. In combination with the Robot camera, it forms a portable automatic unit. The Robot 30′ magazine is also an integral part of the complete Robot electro-automatic registration system. Distributed by *Karl Heitz, Inc.*

Automatic Shutter 138



A new shutter for motion picture printers offering faster printing speeds and improved quality is being introduced by *Electronic Systems, Inc.*, a division of *Electric Eye Equipment Co.* Known as the Hurletron High Speed Automatic Shutter, it provides all 22 standard light settings plus zero light to permit checkerboarding. The new shutter replaces the original shutter in Bell & Howell printers Model D & J, and the Peterson printer. Rapid printing speeds are a result of low-inertia shutter construction. Major moving parts are made of magnesium and aluminum. All motion is ball bearing supported. The entire shutter mechanism is prepositioned by a servo motor. Maximum preset time is 400 milliseconds. Upon cue, the new light setting is achieved in a maximum of 3 milliseconds. This permits printing speeds of 150 fpm when scenes are as short as one foot and when lighting settings for adjacent scenes swing from zero to 22. Major parts are interchangeable and cams are available to give any desired light-setting function. The shutter may be controlled from either a punch tape control system or an automatic board control system.

Microscope Adapter 139

Standard Camera Corporation announces the Praktica Microscope Adapter, a new accessory for the Praktica FX3 and FX2 cameras, as well as any other camera with similar screw mount for the lens. With this accessory, the camera owner is ready for photomicrography with 35mm black and white or color film. The adapter consists of a hinged adapter which is fastened to the draw-tube of the

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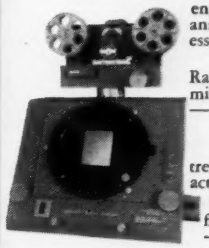

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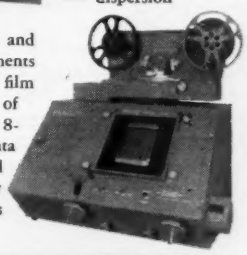

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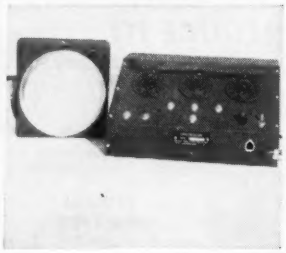

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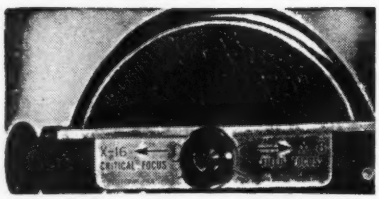

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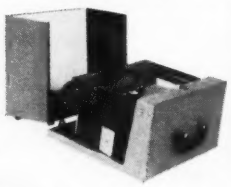

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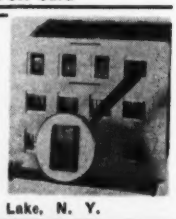

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microscope, an extension tube 50mm in length, and an adapter for the camera.

Pulsed Arc Lights 140

New models of the Ascorlux pulsed xenon Arc Lights have been recently unveiled by *American Speedlight Corp.* The new models are designed for use in smaller work areas than previous models. Model A1111 is a one light unit with a 12″ tube in a 16″ x 18″ reflector. It provides illumination for backlighting 16″ x 20″ areas. Model A1113, a two light unit for process cameras, illuminates copy boards up to 30″ x 40″. Prices: Model A1111, $990; Model A1113, $1,790.

Adjustable 4 x 5 Tank 141

Elkay Photo Products has come up with a new developing tank that simplifies loading by use of a loading guide. Equipped with a base drain, and "lite-tite, fill-top" cover, the unit will accomodate twelve pieces of film from 2¼ x 3¼ to 4 x 5. Price: $9.95.

Constellation Mark II 142

A new remote-controlled 35mm slide projector, utilizing a slide preconditioner which prevents slide popping, has been announced by *Graflex, Inc.*, subsidiary of General Precision Equipment Corp. Known as the Constellation Mark II, the unit has a four-element optical system which makes use of a four inch *f*/3.3 lens. Slides normally pop out of focus as a result of the change in temperature when a cold slide is exposed to heat from the projector lamp. The Mark II distributes warm air evenly over all slides in the magazine to prevent popping. The projector uses an Airequipt Slide Changer and can be operated by means of a 15′ remote control cord. A slide timer can be used to convert it to fully automatic operation. Price: $99.50.

Screw-in 8mm Filter 143

A new Tiffen screw-in filter is now available for Keystone 8mm movie cameras. Released by *Tiffen Marketing Co.*, the filters come in Skylight #1-A and #85 (Type A). Each filter sells for $1.95.

Voigtlander Vito B 144

Voigtlander's new Vito B 35mm camera now incorporates the same life-size brightline finder formerly found only in the manufacturer's more expensive Vitomatic and Vito BR models. The new edition of the Vito B also has an *f*/3.5 color Skopar lens and Prontor shutter as well as single stroke rapid wind lever, pop-up rewind knob, MX synchronization and self-timer. Price: $59.50, with case, $68.45. □

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Camera Part of Unique Operating Room Setup

A shadowless light fitting — of the type used over an operating table — which incorporates a camera is being used by British surgeons for teaching their students. This camera unit, mounted in the center of the light fitting, enables color photographs to be taken to give a surgeon's eye-view of an operation.

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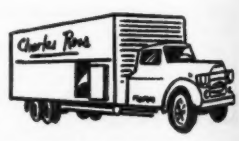

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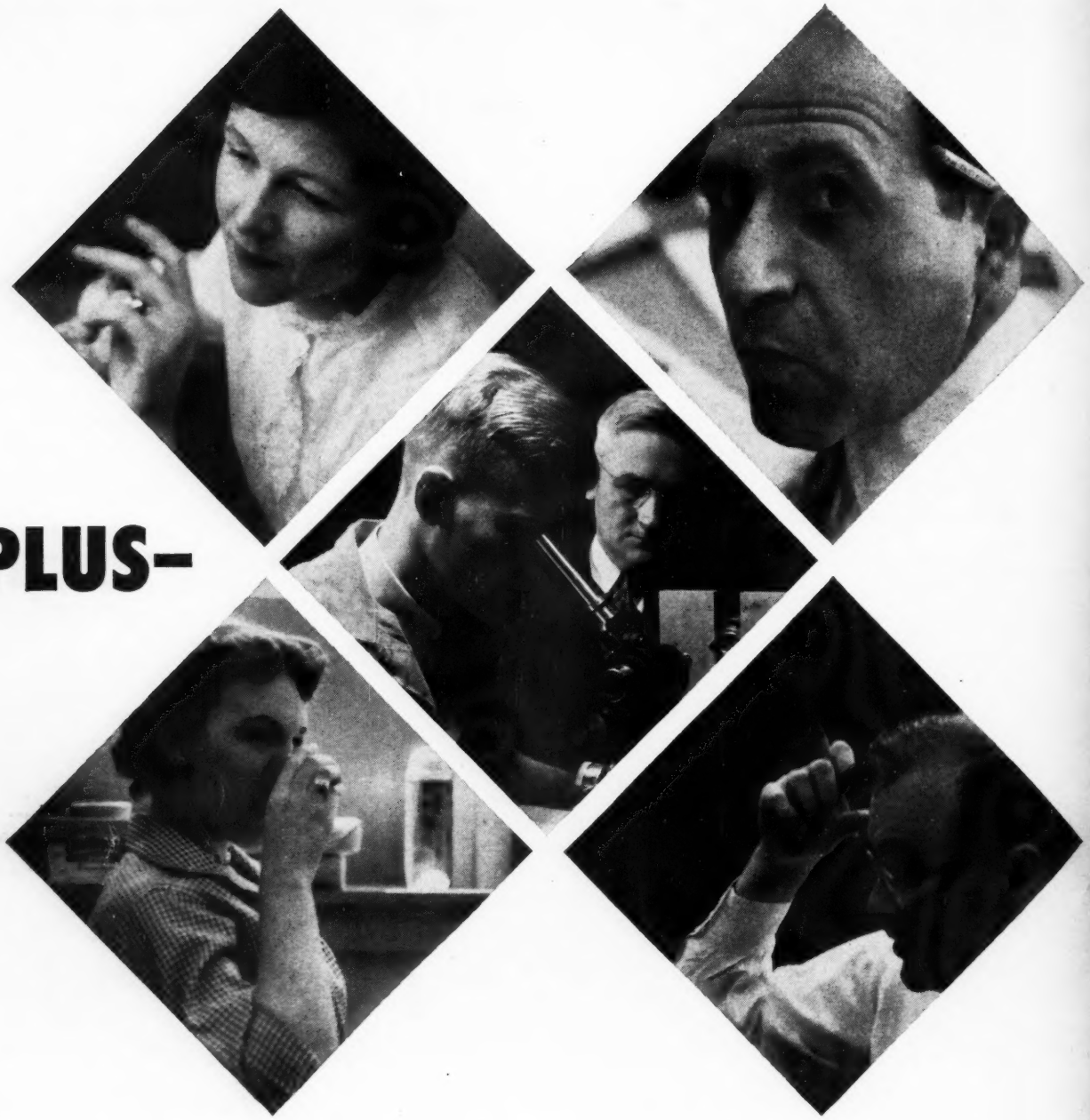

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